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FEDERAL LAND MANAGEMENT PRACTICES AND WATER QUALITY CONTROL. OREGON PILOT REVIEW

Department of the Interior Task Group
Pacific Northwest

December 1969

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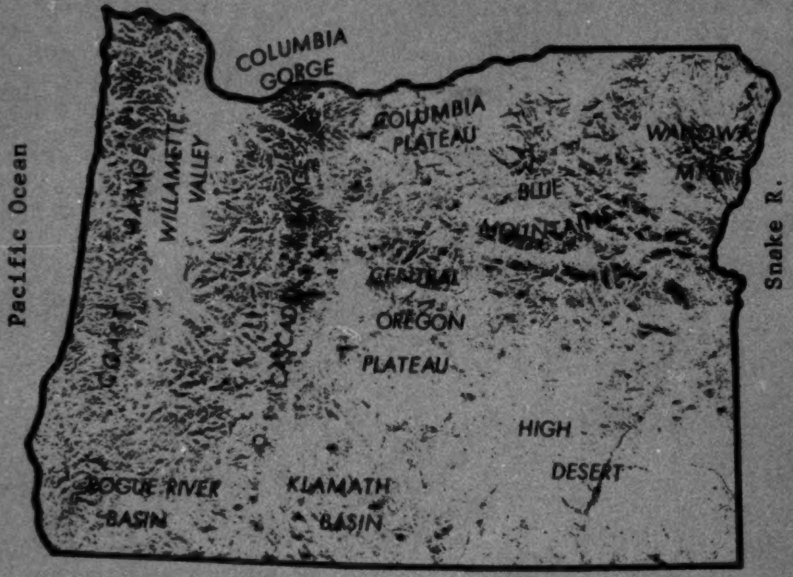
FEDERAL LAND MANAGEMENT PRACTICES
AND
WATER QUALITY CONTROL

Oregon Pilot Review


COLUMBIA GORGE
COLUMBIA PLATEAU
WALLOWA MTS
Pacific Ocean
COAST RANGE
WILLAMETTE VALLEY
CASCADE RANGE
BLUE MOUNTAINS
Snake R.
CENTRAL OREGON PLATEAU
HIGH DESERT
ROGUE RIVER BASIN
KLAMATH BASIN

Compliance with Executive Order 11288
Re: Land Management Practices and
Conservation Measures of Interior Agencies

December 1969

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December 1, 1969

TO: Harrison Loesch, Assistant Secretary, Public Land Management, USDI, Washington, D.C.

THROUGH: Carl L. Klein, Assistant Secretary for Water Quality and Research, USDI

THROUGH: David D. Dominick, Commissioner, FWPCA

FROM: USDI Task Group

SUBJECT: Oregon Pilot Review on Compliance with Executive Order 11288 to prevent, control, or abate water pollution that may be caused by land management practices and conservation measures.

The former Assistant Secretary for Public Land Management, on November 18, 1968, directed that a pilot review be made of Federal land management practices which have an impact on water quality.

The Task Group is transmitting in this report conclusions and recommendations on the responsibility of the Federal land managing agencies and the Federal Water Pollution Control Administration for protecting and maintaining water quality.

Respectfully submitted,

James L. Agee

James L. Agee, Chairman
USDI Task Group, Pacific Northwest

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Part I

(a) Executive Order 11288

(b) Budget Bureau Circular A-81

(c) Memorandum from Assistant Secretary of Public Land Management (November 18, 1968)

Part II

(a) Alsea Watershed Study (March 1967)

(b) Description of Land Conservation Measures

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INTRODUCTION

On November 18, 1968, the Assistant Secretary for Public Land Management selected the State of Oregon for a pilot review of the land conservation measures and practices being carried out by Federal agencies.* A Task Group, representing eleven Department of the Interior agencies in the field, was formed on February 4, 1969, to conduct the study and draft a report.

Nature of the Problem

Federal lands cover a large portion of the United States, about 765 million acres or one-third of the Nation's gross area. Some uses of this huge land area affect water quality directly because they increase the water temperature, amount of sediment transported, and the biochemical oxygen demand (BOD) exerted. Pesticides, fertilizers, and logging debris may fall or be washed into streams. Alterations of the land or the vegetative cover also affect water quality indirectly since quality depends, to a certain extent, upon quantity.

It is not known what proportion of the total national water pollution problem is contributed by Federal land management practices. But the impact on water quality from these activities is known to be substantial and significant. Not all land conservation practices adversely affect water quality, but some will have, directly or indirectly, material bearing upon progress in achieving national goals of clean waters and a quality environment.

The report of the Senate Select Committee on National Water Resources (1960) stated that the sediment transported by runoff water greatly exceeds in volume the combined total of all the other substances that pollute surface waters. Such suspended solids in the Nation's streams amount to at least 700 times in volume the loadings caused by sewage, and give some indication of the magnitude of the problem. Sediment, of course, is only one of several forms of water pollution caused by land uses and management practices.

Executive Order 11288** requires the heads of all Federal agencies to set an example of national leadership in preventing, controlling, and abating the water pollution generated by Federal activities. The Order outlines specific requirements and procedures for three Federal activities: (1) Federal facilities and buildings, (2) major water resource development projects, and (3) facilities or operations supported by Federal loans, grants, or contracts. It does not, however, specifically set forth procedures for land management practices and conservation measures. The lack of a definite requirement for considering these activities, not directly covered in the Order but implied, is, in essence, the primary problem considered here.

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*Addendum, Part 1(c)

**Addendum, Part 1(a)

Program responsibility for the Secretary's functions under Executive Order 11288--to provide the necessary review, coordination, and technical advice and assistance to the efforts of the Federal departments, agencies, and establishments--has been assigned to FWPCA. However, responsibility for establishing water quality control measures--to assure that land management practices and resource conservation measures are in compliance with the Executive Order and with the appropriate water quality standards established by the States and the Secretary of Interior--rests with the operating agencies.

Purpose and Objective of Study

The land managing activities carried out by the Federal Government need to be reviewed in order to: (1) obtain a better understanding of the effect of measures and practices on water quality, (2) determine the extent to which continuing review on a routine basis is warranted, and (3) safeguard the quality of the Nation's water resources by insuring that the objectives set forth in Executive Order 11288 are being achieved.

A sense of urgency has been given to the matter. Correspondence and meetings on this subject have already occurred with FWPCA and representatives of the Interior agencies engaged in land management. Information and guidance were requested relative to being in accordance with Executive Order 11288. As a result, it was deemed advisable to review the measures and practices being applied in a limited "pilot" area, the State of Oregon, to more definitely determine the kind, size, and location of operations which have an impact on water quality but are not covered by existing review procedures. This additional information is needed in developing a national strategy and before a formal position can be taken.

Thus, the primary objective of the pilot review is to identify and appraise the kinds of management practices and conservation measures that appear to be having a significantly adverse impact on water quality; and, furthermore, to recommend a procedure whereby FWPCA can provide assistance and recommendations to the operating agencies in management for effective quality control.

The pilot and demonstrational character of the Oregon review should be of national significance in the pointing of directions for action and the development of ways and means of solving water pollution and related environmental problems in Federal land management, and more indirectly, by example and suitable cooperative controls, on other public and private lands.

National Significance

The basic and general goal is to protect and enhance the quality of our human ecology and environment in the interests of material and spiritual excellence, human well-being, and even survival. "Today we face perhaps the gravest--certainly the most stimulating--challenge in the history of conservation. It is the challenge to build a quality society--one in which we manage not just to preserve the delicate balance between the needs of our people and the natural resources of our land, but actually to improve the heritage which has been handed to us."*

As has been said, the Federal lands represent a substantial proportion of all national lands. These lands, like all lands being used by man, may contribute to water pollution; they are subject to the problems, principles, and measures of water quality control.

In implementing the Executive Order, based on the Water Pollution Control Act, the attack on water pollution must be on both of two major fronts--facilities and land management. A double threat, from facilities and the land itself, is aimed most directly at man's environment. As this country strives to accommodate more human beings than it has ever had to serve before, increased demands will be placed on our natural resource bank. Our lands seem destined to become increasingly crowded, noisy, and soiled. The Federal lands will bear a share of these impacts and demands.

The environmental squeeze from technology and population pressures will mean more than the mere loss of mineral reserves, air and water quality, and forest and range resources. Man's chance to live a quality life in a quality environment will also be diminished.

As the Federal agency with the widest variety of conservation duties, the Department of the Interior operates all over the environmental spectrum. Water quality control is, of course, only one aspect of man's larger quest for a quality life in a quality environment. But it is an important part.

Thus, the needs and aspirations of future generations make it a duty to manage Federal lands so as to minimize adverse environmental impacts. Land management agencies are the trustees of these lands and resources for our children and their children. The future of succeeding generations in this country will be shaped, in part, by decisions and actions under Executive Order 11288. The consequences of those decisions and actions cannot be escaped. The task of carrying out Executive Order 11288 calls for a more exacting view, and the highest wisdom, courage, and energy that can be accorded it.

The economic, social, and environmental benefits--and necessities--of improved management of the Federal lands for water quality control will obviously justify technological and administrative costs. The following pages, representing work done by the Task Group, provide highlights of the Oregon pilot review of Federal land management practices and their interactions with water quality.

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*Quest for Quality, Department of the Interior, 1965.

FINDINGS AND CONCLUSIONS

1. The Interior agencies are well aware of the importance of protecting water quality and are carrying out many practices to prevent pollution. In some instances they are monitoring certain water quality parameters in streams draining the lands which they manage. Additional precautions, however, are needed in many instances. Each agency reported cases where their practices were adversely affecting water quality to some degree.

2. The identification of land management practices and conservation measures showed that 10 Federal agencies of the Department of the Interior were involved in 12 kinds of land practices and conducting 22 kinds of conservation measures that have an impact on water quality. Conservation measures, per se, are beneficial to land management and water quality, particularly in the control of sedimentation.

These Federal activities are being carried out on 17 million acres, constituting over half of the Federally owned land in Oregon, or about one-quarter of the State's total land area. The Oregon pilot review covered a wide range of conditions, with marked differences in topography, altitude, humidity and aridity, soil, cover, land use, and culture. The majority of land management practices and water quality problem types are represented.

3. The impact on water quality from these land managing activities stems from one or more of the following: The very nature of the management practice, improper management procedures, or lack of carrying out certain conservation measures to the extent necessary for adequately controlling water pollution.

A quantitative estimate of pollutants generated by such activities could not be made in this pilot review. Therefore, the degree to which they actually lower the quality of lakes, streams, rivers, and groundwaters in Oregon is not known. But the serious nature of the problem is evident from the types of pollution reported.

The pilot review disclosed several types of existing water pollution problems arising from these operations--namely--sediment, agricultural chemicals, plant nutrients, inorganic salts and minerals, and organic wastes.

4. These kinds of land managing activities also hold a continuing pollution threat to the water resources. Sediments are the main potential for pollutants. Animal wastes, salts and minerals, and agricultural chemicals are of major concern, too. Other wastes which are significant and can adversely affect water quality include infectious agents, turbidity, and heat.

Any of the land management practices could possibly cause one or several changes in the quality of water. Some of these activities have both plus and minus effects on water quality. Certain associated conservation measures can and do abate pollution and improve water quality.

5. The investigation of current procedures being used to conduct land management practices and conservation measures constituted a general screening at best. The Task Group recognizes that the entire scope of land management procedures, however, needs in-depth and continuing analysis, as there is plenty of room for improvement.

6. Many critical conservation and land treatment measures are being employed without adequate surveillance. Monitoring of streams draining Federal lands is needed. Such monitoring should be requested by the Federal land managing agencies and performed generally by FWPCA and USGS within the directives of BOB Circular A-67.

7. The burden of water quality control rests with the land managing agencies. It is the Task Group's opinion that if the operating agencies are to prevent pollution, then they must improve and expand their capabilities for water quality control. Current programs for controlling water pollution are lacking in scope, intensity, coordination, manpower, and funds.

8. Section 7 of the Executive Order has not been fully implemented. A review and inventory of facilities or operations supported by Federal grants, contracts, and loans has not been accomplished; nor has the essential technical assistance for the purpose been provided to the Federal land managing agencies.

9. The pilot review revealed a number of land practices and conservation measures being conducted under Federal grants and contracts. It appears that the regulations for administering these grants and contracts are fairly specific as to water pollution, and provide a vehicle for enforcement. But some of these operations nevertheless are polluting the waterways, and instances are cited in this report. More significant is the fact that their potential for causing pollution is high.

10. The findings of this pilot review indicate that Executive Order 11288 should be strengthened to cover land management practices and conservation measures being carried out by Federal agencies. The kinds of land management practices and measures identified in this pilot review--that have an impact on water quality--are not listed in the Order. They are implied, but not directly covered; nor does the Order set forth specific requirements for such activities.

Land management practices have largely been excluded from priority consideration in the development of national policy on the discharge of wastes from Federal activities. The main concern since 1935 to date has been on the waste disposal practices of Federal facilities rather than lands.

The Task Group believes that the Executive Order is incomplete as to scope, making it inconsistent with the objective that all Federal activities should set an example in the abatement of water pollution.

11. Based on the findings of the Oregon pilot review, the Task Group concludes that a nationwide review of Federal land management practices and conservation measures on a continuing basis is warranted. Establishment of such a review would mark a turning point in the history of pollution abatement from Federal activities. Pinpointing sources of pollution from land management practices and conservation measures would heighten the interest and concern of many agencies; it would provide a platform for continuous and vigorous corrective action; and it would pioneer in the needed improvement of management of all lands from the standpoint of pollution control.

12. There is need for an administrative procedure, supported by Executive Office and Departmental policy and direction, to coordinate Federal agency efforts to improve the control and abatement of water pollution from their land management practices, and whereby the FWPCA can more effectively perform its mission of providing assistance and recommendations to the operating agencies.

13. A continuing program of Federal land management in the interest of water quality control is not only justified but imperative. The benefits are obvious in a number of fields: water pollution and anti-degradation control, water supply, watershed management, flood management, fish and wildlife conservation, outdoor recreation, as well as in land stabilization and management for its other multiple purposes.

14. A continuing program of land management for water quality control should properly include (a) essential management or "operation and maintenance" measures to insure high standards of quality, (b) special "betterment" or capital improvement projects and programs for restoration of lands to effective operating condition, and (c) "research and development" programs to meet needs and opportunities associated with changes in land use and in improvement and management technology.

RECOMMENDATIONS

The Task Group considered numerous proposals for policy, program, and administration. The resulting recommendations set forth here total twenty-eight, divided into two groups: six specific administrative action proposals and twenty-two other recommendations relating to management in various fields.

The action proposals call for a continuing nationwide survey of land management practices and conservation measures; an administrative procedure whereby the Federal agencies can comply with Executive Order 11288 and FWPCA can provide technical assistance to the land managing agencies; a technical training program on land management practices and water quality control; and strengthening the Executive Order and Budget Bureau Circular A-81. Other recommendations deal with the land management practices identified in this pilot review and are illustrative of the scope of review proposed.

PROPOSALS FOR ADMINISTRATIVE ACTION

Continuing Survey

1. The Task Group recommends that an order be issued by the Secretary of the Interior, directing the Federal land management agencies, in cooperation with the FWPCA, to make surveys of land practices and conservation measures being carried out by Federal agencies and develop reports thereon as to their impact on or relationships to water quality, together with recommendations for correcting adverse conditions. Intergovernmental cooperation in this effort should be "pursued vigorously" without creating a review or suppressing authority at the field level in the conduct of conservation programs of individual agencies.

Field surveys and investigations of Federal land management practices and conservation measures should be conducted for the purpose of determining:

(a) The extent of water pollution caused by such activities;

(b) The adequacy of management procedures to control water pollution;

(c) The remedial measures necessary to abate and control pollution;

(d) What program plans the Federal agency has for applying the remedial measures which are deemed necessary;

(e) What FWPCA can offer toward assisting in correcting the pollutional situation and in developing appropriate abatement plans.

Immediate attention should be given to those land practices and conservation measures that are affecting water quality within: (1) areas where enforcement procedures have been (or are going to be) invoked under the Federal Water Pollution Control Act; (2) areas where it appears that State water quality standards will not be met; and (3) areas which have been the subject of public complaints.

FWPCA should make a periodic review of land management practices and conservation measures supported by Federal contracts, grants, and loans to determine the extent to which water quality provisions and standards are being adhered to by contractors, grantees, or borrowers. Reports on the findings and recommendations of these reviews should be submitted to the Bureau of the Budget, where special funds and/or authority appear to be needed.

Land management practices and conservation measures are not static operations, nor are their impacts on water quality. New pollution problems will develop as changes occur in land use and in the management of land and water areas. There must be a continued monitoring of land management practices and conservation measures.

The Federal land management agencies and the FWPCA cannot effectively perform their missions unless they maintain regular investigations on Federal land management practices and conservation measures, which should uncover water pollution problems and the means necessary to resolve them.

Administrative Arrangements

2. The Task Group recommends the following administrative arrangements and procedures to be followed by the Federal agencies in complying with Executive Order 11288 in connection with prevention, control, and abatement of water pollution from land management practices and conservation measures:

A. Meetings

(1) Annual policy meetings should be held at the Headquarters level between the Commissioner, FWPCA, and designated representatives of the Federal land managing agencies.

(2) Regular annual meetings between the Regional Director, FWPCA, and designated representatives of the Federal agencies should be held at the regional level to review and evaluate land management programs and related water pollution problems.

(3) Special meetings at the lower organizational levels should be called at the request of either FWPCA or the Federal agencies to resolve any technical or procedural matters.

B. Exchange of Information

(1) The land managing agencies should furnish FWPCA with information on the kinds of land management practices and conservation measures being conducted and their impact on water quality.

FWPCA's Division of Planning and Interagency Programs should develop a set of guidelines in consultation with the Federal land managing agencies in fulfilling this information request.

(2) FWPCA should provide the Federal land managing agencies with information concerning advances in technology, water quality standards, and other requirements relating to the control of water pollution from Federal land managing activities.

(3) Similarly, FWPCA should make available to the operating agencies the findings of research projects as a basis for improving land practices and upgrading conservation measures.

C. Review and Evaluation Procedures

(1) Review of proposed land management programs and projects having an impact on water quality should be made during the early stages of planning, in advance of agency budget programming.

(2) It should be the responsibility of FWPCA to (a) evaluate those land management practices and conservation measures having an impact on water quality, and (b) formally advise the operating agencies whether such activities are consistent with Executive Order 11288, established water quality standards or other requirements, and whether any proposed combination of land managing activities will be coordinated in timing with State, county, or municipal programs so that water pollution control can be achieved on an area-wide basis.

Task Group for Continuing Guidance and Coordination

3. A task group representing interagency interests at a regional level is recommended as the desirable administrative mechanism to carry out the above-mentioned procedure. The group would serve the purposes of general guidance, coordination, counsel, and review for water quality control in land management operations. Such an organizational arrangement should function under FWPCA leadership, with the Regional Director as Chairman.

Technical Training

4. The Task Group recommends that technical training programs on land management practices and water quality control be developed cooperatively by the Federal land managing agencies and the FWPCA. Such programs should provide specialized training through short- and long-term courses which will (a) improve the skills of professional and technical personnel from the Federal land managing agencies, other governmental agencies, and private organizations, and (b) lead to rapid application of new research findings.

Strengthening the Executive Order

5. The Task Group recommends that Executive Order 11288 be strengthened specifically to include land management practices and conservation measures having an impact on water quality. Specifically:

A. Section 1. Policy should be amended by changing objective number (3) to read in effect: "Pollution caused by all other operations of the Federal Government, such as water resources projects, land management practices, and operations under Federal loans, grants, or contracts, shall be reduced to the lowest level practicable."

B. A new section should be added to the Executive Order outlining general procedures and reporting requirements for Federal agencies to follow in connection with land management practices and water quality control.

C. Section 4 on General Standards should be expanded to include standards pertaining to sediment, turbidity, debris, chemical-organic-and-inorganic, bacterial contamination, nutrients, salinity, oxygen deficiency, temperature, and other pollutants, to ensure all necessary provisions to protect the quality of the receiving waters in Federal land management practices.

Strengthening the Bureau of the Budget Circular A-81

6. The operating agencies furnish the Bureau of the Budget with annual reports, detailing the kinds of land management practices and conservation measures engaged in where water pollution problems exist or appear to be developing, and recommendations for their early solution.

In order to conform with Executive Order changes, the Bureau of the Budget should amend Budget Bureau Circular A-81 to include instructions for the Federal agencies to follow in reporting their requirements for preventing, controlling, and abating water pollution by Federal land management practices and conservation measures.

MANAGEMENT RECOMMENDATIONS

The foregoing recommendations are concerned with reducing, through administrative means, water pollution generated by the land management practices identified in this pilot review. The unveiling of these findings in this test study further substantiates the need for a nationwide review of Federal land management practices in order to comply with the intent and spirit of Executive Order 11288. The following recommendations are illustrative of the scope of review proposed in various fields of land management.

Timber Management

1. Improvements in timber management practices are to a large measure dependent upon new and revolutionary developments in logging equipment and logging methods. The Interior agencies themselves do not engage in equipment development. However, the Task Group favors research along these lines and encourages greater efforts in this direction.

2. There is a need for more research to define the degree and extent of loss of water quality resulting from timber management practices and the limits of tolerance available to the land manager in managing a commercial forest. An example of the kind of research needed is the Alsea Watershed Study--a study of the effects of logging on water quality and fishery resources in three small Coast Range watersheds in Oregon. Excerpts from this study are in Part II of the Addenda.

Range Management

Existing procedures provide acceptable means for improving water quality on public lands through the scientific management of livestock grazing. Consistent with existing authority, procedures provide for livestock use manipulation to accomplish specific resource management objectives. Use adjustments can be made to increase effectiveness of management in meeting objectives.

Although specific recommendations have not been made for improving grazing management procedures, additional funds and manpower would improve water quality by obtaining more intensive management on a larger percentage of public lands.

Existing technology, methodology, and research can provide the means to accelerate improvement of range conditions. There will be a greater implementation of existing technology in range management. The agencies' range management programs will test and incorporate applicable new technology and research as it becomes available.

Watershed Management

3. Major contributions to the conservation and improvement of water quality throughout the Nation must be made through public information and education programs which should in time create a general awareness of the need for carrying on conservation programs. The Federal Water Pollution Control Administration should take the lead in this area and coordinate a national effort to: (1) inform the public of the seriousness of the water pollution problem, and (2) assist in obtaining adequate funds for Federal agencies responsible for the administration and management of the public land and water resources.

4. The FWPCA should materially coordinate an effort to develop effective and equitable regulations for water quality control on all watersheds regardless of Federal management. This should be worked out "on the ground" within the framework of a multiple of objectives, standards, etc., of all agencies.

Outdoor Recreation

5. Body waste problems should be alleviated by programs of providing adequate sanitary facilities in areas where heavy use is being experienced but intensive recreation site development and supervision are not feasible. Cost of such facilities should include maintenance. Agency budgetary allocations to date have provided for only minimal clean-up of undeveloped sites.

Road Construction

Research and study of erosion and siltation resulting from road construction and maintenance is urgently needed. At the present time only the basic problems and solutions have been recognized and set forth. To accomplish the control necessary requires basic guidelines which can only be established through research and study of the problems. Specifically, there should be:

6. More intensive practices and procedures for control of erosion and siltation through research and planning on the problems encountered in road construction on Federally owned lands.

7. More effective enforcement of the practices and procedures developed under (6) above. This includes education and cooperation of all users of Federal lands.

8. A meaningful cooperative agreement with other Federal and State agencies concerned with water pollution control. An

agreement of this type could encompass joint studies, exchange of research and operational data, joint inspections and reports, and other pertinent activities.

9. A comprehensive study of road maintenance needs on Federally owned lands. This would include analysis of present program deficiencies and corrective measures, adoption of new techniques and procedures, adequacy of projected funding levels, manpower and equipment requirements necessary to meet anticipated future workloads, etc.

10. Increased appropriations to extend the maintenance program to provide greater coverage in the field of preventive maintenance is basic to erosion control. Expansion of the mulching program, for instance, would come under this phase of maintenance.

Fire Protection

Fire control practices should be modified in the interest of water quality. For example:

11. Aircraft pilots should be instructed to make aerial drops of slurry away from live streams where applicable. Fire trails on steep slopes should be water-barred. Garbage and refuse around fire camps and along the fire perimeter should be disposed of after a fire is mopped up.

12. Consideration should be given to the immediate reestablishment of vegetation by most practical means to control erosion on burned-over lands.

13. A reappraisal of timber salvage efforts should be made as a result of the problems observed on some burns. Burned range land--where soil, topography, and degree of burn justify--should be immediately reseeded to forage grasses or other suitable ground cover. The main object of any fire rehabilitation program should be to restore a vegetative cover to the burned-over area, thereby reducing soil loss and resultant stream sedimentation.

Minerals Management

14. The agencies involved in mineral land management should work more closely with the minerals industries in a cooperative effort to reduce water pollution and improve land reclamation. More cooperative work should be done with the individual miner, or other producer, with an objective of preventing water pollution. Efforts should be made to assist and cooperate with State agencies who have responsibilities in governing water pollution and mineral production.

15. The Task Group recommends that all Federal agencies involved in extraction of natural resources expand their

evaluation and research programs to include water quality control. Waste and pollution must be controlled at each step in the excavation and conversion of raw materials into finished products. Research and planning work of State and governmental agencies should anticipate problems of chemical, nutrient, bacteriological, temperature, radioactivity, or other pollution, which may arise from present and future waste disposal operations on public and other lands.

Wildlife Management

16. The Task Group has considered the exception of fish hatchery (constructed and/or operated through Federal Government funding) effluents from compliance with Executive Order 11288. It was found that a program has been initiated by FWPCA, BSF&W, and BCF to monitor and evaluate fish hatchery effluents and waste disposals to determine the extent of potential water quality degradation by fish hatchery operations. Should fish hatchery effluents be found to contribute pollutants to receiving waters below acceptable limits, then facilities will be installed or operating procedures established to control waste discharges and maintain water quality.

Miscellaneous

Contracts, Grants, and Loans

17. The importance of water pollution and erosion control measures should be a requirement in the instructions to construction and operations inspectors so that they will be more conscious of the Federal Government's concern for the enforcement of the measures in the specifications designed for more adequate control of the quality of water and environment. The importance of having an adequate inspection force to make certain that the intent of water quality specifications is carried out should be stressed.

18. An important aspect in this area is the need of adequate levels of funding to carry out inspections and compliance checks. To this end, the Task Group recommends more manpower and financing so that the Federal agencies can accomplish more finite management planning and more vigilant administration of the many contracts entered into each year.

19. Where they do not now exist, special provisions for preventing water pollution should be incorporated into each contract, grant, and loan, where the type of work to be accomplished will have an impact on water quality.

Water Resources Investigations

20. The present water quality monitoring network should be modified to include the monitoring of yet unidentified pollution

causing land management practices and conservation measures. The network for monitoring the quality of groundwater should be expanded. A permanent program of sampling for pesticides* should also be established.

21. In monitoring performance of a conservation measure, emphasis should be placed on its long-term effects rather than what happens immediately after its installation. For example, the construction of a hydraulic structure or clearing debris in a channel may cause increase in sediment load downstream for a short period, but if the measure functions as designed, the long-term result will be a reduction in sediment yield. Similar short- and long-term relations result from some kinds of land tillage to improve vegetation.

Massive Chemical Pollution

22. Cooperative organizational arrangements, plans, and facilities should be established with entities and agencies affected, such as irrigation and other water service districts, construction and operating contractors and lessees, etc., in order to effectively protect and contain accidental spills which might create massive and devastating pollution problems.

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*The word "pesticide" includes herbicides, insecticides, fungicides, and chemicals used for rodent and varmint control.

CHAPTER I

LIMITS OF THE STUDY AREA

The immediate limits of the pilot review are specific. They include only those land and water areas managed by the Interior agencies or under their purview.

Agency (USDI)	Total Acres	
BLM	15,658,000	
NPS	160,895	
BR	238,349	
BSFWL	454,525	
BIA	1,152	
BPA	3,104	
BOM	47	
Total USDI		16,516,072

Four other Interior agencies have been included in the review. They are BCF, USGS, BOR, and FWPCA. These agencies do not manage any lands, but they do affect water quality indirectly through their loan, grant, and contract practices, and programs, studies, and investigations.

The State of Oregon contains about 61.6 million acres. More than 52 percent of this land area is Federally owned. And over one-half of the total land in Federal ownership is administered by the Interior agencies.

Four physiographic provinces lie within the study area: Pacific Border Province, Cascade Mountains, Columbia Intermontane Province, and the Basin and Range Province. The Pacific Border Province includes the Coast Range with its dense Douglas fir forests growing to ocean's edge, and the fertile Willamette River Basin--a broad lowland which contains the State's largest population, major cities and industries, and a diversified and specialized farming area.

East of the Willamette River Valley lies the Cascade Range which extends through Oregon in a general north-south direction. It is the most topographic barrier in the State and divides Oregon into two broad climate subregions--the mild, comparatively wet west and the more extreme, drier east. These mountains boast large expanses of fir and pine forests and snowfields; 11,245-foot Mount Hood is the highest peak in Oregon.

The Columbia Intermontane Province includes the Central Mountains (Wallowas, Elkhorn, Greenhorn, Adrich, and Ochoco Mountains), Harney High Lava Plains, Malheur-Owyhee Upland, and a part of the Snake River Lava Plain. This physiographic province comprises a complex group of folded and faulted uplifts reaching elevations of 10,000 feet; plateaus incised by canyons and valleys (Deschutes and John Day rivers); and desert areas of high lava plains and uplands.

The Basin and Range Province covers south central Oregon and is characterized by a high lava plain interrupted by fault block mountains and by fault troughs. Representative of the high standing blocks are the Steens Mountains, Hart Mountain, Abert Rim, and Winter Ridge. The typical fault troughs are Alvord Basin, Warner Valley, and the basins of Abert, Summer, Goose, and Klamath Lakes. This area is near desert and sparsely settled. Primary use of most of the land is for livestock grazing. Some of the largest cattle ranches in the Pacific Northwest are found here.

Lands included in the study area are primarily concentrated in the latter two provinces, located in the southeastern sector of the State. This is high desert country with rough, rocky, arid ranges where sagebrush is the predominant vegetative cover. Low erratic precipitation and a general lack of major perennial streams are the major limiters to noteworthy economic development in this part of the State. Most of the land is used for livestock grazing. The remaining lands of the study area are distributed throughout the other physiographic provinces.

It is apparent from the map (Addendum, Part IV) that these lands cover a wide range of climate, topography, soils, and vegetation. Significance in water quality control varies widely among land management practices, conservation measures, and geographic provinces. Due to this fact, many of the findings, conclusions, and recommendations contained herein will undoubtedly apply elsewhere.

CHAPTER II

IDENTIFICATION OF LAND MANAGEMENT AND CONSERVATION MEASURES THAT HAVE AN IMPACT ON WATER QUALITY

Knowledge as to either the kinds and locations of practices and measures being conducted by the Federal land managing agencies, or the pollutional effect generated by their activities has not been centrally organized. One of the first steps of the Task Group, therefore, was to identify these activities. This identification was undertaken to assist the Group in determining what corrective actions and review process would be needed to carry out the intent of Executive Order 11288.

The kinds of management practices or programs being conducted are classified:

Timber Management
Range Management
Stream Protection
Watershed Management
Fire Protection
Minerals Management
Road Construction & Maintenance
Outdoor Recreation Development
Wildlife Management
Power Line Construction
Canal and Reservoir Management
Cropland Management

The kinds of conservation measures being carried out fall in the following classes:

Seeding and Planting
Brush and Weed Control
Pest and Disease Control
Slash Burning and Disposal
Water Development
Fencing
Cattle Guards
Stock Trails
Grazing Systems
Hydrologic Structures
Watershed Tillage
Stream Debris Removal
Streamside Buffer Strips
Bank Leveling
Road and Trail Relocating
Rock Riprap and Gabions
Spawning Gravel Replacement
Fish Hatcheries
Sanitation Controls
Irrigation
Fertilizing
People Controls

Table 1 summarizes the 12 major management practices and 22 conservation measures identified by the Task Group. Most of the practices combine five or more conservation measures to accomplish proper land management and use to make up an operating system, or otherwise to accomplish a conservation purpose or objective.

For the sake of reporting, certain conservation measures have been grouped under one individual heading, since several methods can accomplish the purpose. For example: Watershed tillage includes contour and terracing, trenching and furrowing, ripping, and pitting. Hydrologic structures covers detention dams, retention dams, check and drop dams, diversion dams, dikes, and waterspreading. Each identified conservation measure is described in Part II of the Addenda.

SUMMARY OF PILOT REVIEW

TABLE 1

LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT	X	X	X	X						X				X	X	X	X	X				
RANGE MANAGEMENT	X	X	X		X	X	X	X	X	X	X		X			X	X	X				
STREAM PROTECTION	X					X			X	X				X	X	X	X	X	X		X	
WATERSHED MANAGEMENT	X	X	X		X	X	X	X	X	X	X		X		X	X	X	X				
FIRE PROTECTION	X	X	X	X	X		X		X					X								
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE	X	X		X		X	X			X				X	X		X	X	X			
OUTDOOR RECREATION DEVELOPMENT	X	X	X	X	X	X	X			X				X	X	X	X	X	X		X	X
WILDLIFE MANAGEMENT	X		X		X	X	X	X	X	X	X			X	X	X	X	X	X	X		
POWER LINE CONSTRUCTION	X	X		X														X			X	
CANAL & RESERVOIR MANAGEMENT	X	X	X			X	X							X		X		X			X	
CROPLAND MANAGEMENT	X	X	X			X				X	X	X	X									

X = Existing

The practices and measures identified below represent Federal activities not directly covered under Executive Order 11288. They also constitute the main base of this pilot review for establishing a procedure of continuous review and assistance, and for insuring that the objectives set forth in the Executive Order are achieved. By their very nature, some of these land practices and conservation measures contribute to water pollution directly. A few have both plus and minus effects on water quality. Others affect water quality indirectly, due to the lack of carrying them out to the extent necessary for adequately controlling water pollution. It should be kept in mind that conservation measures, *per se*, are beneficial to land management and water quality, particularly in the control of sedimentation.

The operating agencies were requested by the Task Group to identify those practices and measures having an impact on water quality. Their responses follow.

Bureau of Land Management

The Bureau of Land Management is responsible for the administration and protection of 15,658,000 acres of Federally owned land in the State of Oregon. The management of these lands is based on the "multiple use concept."

Programs which direct BLM's management of resources, including water, are forestry, range management, recreation and wildlife, watershed conservation and development, lands and minerals, stream protection, and roads and trails. The kinds of management practices and conservation measures conducted by BLM are summarized in Table 2.

BUREAU OF LAND MANAGEMENT

TABLE 2
LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

LAND MANAGEMENT PRACTICES	CONSERVATION MEASURES																					
	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT	X	X	X	X						X			P	X	X	X	X	X				
RANGE MANAGEMENT	X	X	X		X	X	X	X	X	X	X		X		P	X	X					
STREAM PROTECTION	X					X			X	X				X	X	X	X	X	X			
WATERSHED MANAGEMENT	X	X	X		X	X		X	X	X	X		X		X	X	X	X				
FIRE PROTECTION	X	X			X		X		X					X								
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE	X	X		X		X	X			X			X	X	X		X	X	X			
OUTDOOR RECREATION DEVELOPMENT	X	X	X	X	X	X	X			X				X	X		X	X	X		X	
WILDLIFE MANAGEMENT	X		X		X	X	X	X	X	X	X			X	X	X	X	X	X			
POWER LINE CONSTRUCTION	X																					
CANAL & RESERVOIR MANAGEMENT																						
CROPLAND MANAGEMENT																						

X = Existing P = Potential or Anticipated

1. Timber Management

The major purpose of the timber management program is the sustained yield and multiple-use management of timber resources on some 2,300,000 acres of O&C, CBWR and public domain lands in western Oregon and 1,024,000 acres of public domain lands in eastern Oregon and Washington.

Annual sales of timber from Bureau of Land Management administered lands in western Oregon amount to about 1.3 billion board feet. In addition, approximately 24 million board feet are sold in eastern Oregon. These volumes are based upon the allowable cut for the lands plus a measure of mortality salvage and thinnings not chargeable to the allowable cut. This volume is harvested from some 70,000 acres of land. Two out of every three of these acres are harvested on a partial cut base. The other acre is clear-cut.

To facilitate the harvest of timber and management of the forest an extensive road system is required. Currently the Bureau's road network numbers about 6,400 miles in western Oregon. New construction adds about 500 miles of road to the system each year. The roads are constructed by timber sale purchasers pursuant to the terms of timber sale contracts and by the Government through expenditure of appropriated funds.

Regeneration of timber stands is of prime concern in Bureau operations. As areas are cut over it is necessary to return the land to forest production. In preparing management plans, Bureau foresters select those cutting methods or silvicultural practices which are best suited to the prompt natural restocking of the cut-over areas. In time, much of western Oregon will reproduce itself naturally. However, as an aid to nature and to keep the land productive, the Bureau reforests by planting and seeding an area of about 30,000 acres annually. In addition, site preparation measures are carried out on about 18,000 acres a year. When site or stand improvement measures require the use of pesticides or herbicides, advance approval for the use of such materials is secured from the Federal Pesticide Control Committee prior to application.

Specific measures are undertaken on lands denuded by fire. As a precautionary measure such lands may be seeded with grass or a cover crop, such as mustard, to stabilize the site and protect it from soil erosion until such time that it can be reforested.

Over the years the Bureau has participated in stream clearance operations for the purpose of opening up coastal streams for use by anadromous fish. Log jams located on BLM lands containing merchantable wood have been sold with the timber purchaser recovering the good wood and cleaning the stream in the process. In other instances the Bureau has entered into cooperative agreements with the State agencies on a cost-sharing basis to provide for stream clearance.

2. Range Management

The Bureau of Land Management is responsible for the management of approximately 14 million acres of rangeland in Oregon. Each year approximately 440,000 livestock and 300,000 big game animals make substantial use of the forage produced from these lands.

The Bureau's range management program includes the management utilization and development of livestock forage in a manner designed to improve and maintain forage and watershed conditions, and protect other resource values.

Grazing management systems are most important to provide for proper use and improvement of the resources. Objectives of these systems are to improve vegetative composition and density, and watershed condition. Grazing systems used are season-long, deferred, rest rotation and/or modifications as may be adaptable to specific situations.

Once grazing systems are implemented, studies are set up to assist in evaluating results of management.

Trend studies provide written and visual records on resource changes resulting from livestock and wildlife use. Key areas are determined and crucial areas are delineated. Range suitability is recognized and considered.

Recognition of wildlife and watershed crucial areas is extremely important. These require special management considerations and/or protection.

Utilization studies are conducted until a system becomes stable.

Climatic data is tabulated and used to show the interrelationship of climate, resources and use.

Actual grazing use is determined for livestock and/or wildlife without reference to recommended use. This information is obtained annually where grazing systems or allotment management plans are in effect and is used for management evaluation purposes. Big game wildlife counts are made annually.

Management facilitating projects are incorporated into allotment management plans and used to complement various management techniques in livestock and wildlife management.

Fences are constructed to restrict and control livestock movements. They are also used to exclude certain areas from livestock grazing. Examples of fencing for exclusion of livestock use are fences along both sides of perennial waters, overflow from springs or fencing of the spring proper with water piped to tanks located away from the spring. Fences for this purpose provide clear, clean water at springs and protect stream banks from trampling while allowing for maximum vegetative growth along stream channels.

Springs are developed to assist in livestock and wildlife distribution. Their development increases dependability of water production while reducing trampling and erosion of the immediate area. Pipelines are used to distribute water where it is not available. This reduces livestock and wildlife concentrations.

Stockwater reservoirs reduce the degree and intensity of water runoff from snow melt and heavy rains. They provide areas for settling of soil particles carried in runoff. They also provide for more uniform use of the vegetative resource by wildlife and livestock. This reduces the degree of livestock concentration.

Salting away from water is a practice used to distribute livestock and wildlife.

Livestock trails are constructed for proper utilization of the forage resource and to assist in livestock management. They are constructed where movement is restricted by topography or land structure and where free movement from water to grazing areas is needed. Trails are constructed with a minimum of disturbance to the ground surface to prevent water runoff and erosion.

3. Recreation and Wildlife Development

A. Recreation Development--BLM has approximately 70 sites developed to some degree for recreation in Oregon. Types of recreation developments include camp grounds, picnic areas, marine facilities, beaches, winter sports, access roads, scenic overlooks, and hiking and riding trails.

Recreation facilities are constructed to BLM specifications. Running streams and bodies of water are protected from pollution. Sanitary facilities protect groundwater from pollution. All toilets are designed to take care of human waste at least to the extent of retaining and treating it in vaults.

Water used for human consumption must meet standards established by the United States Department of Health, Education, and Welfare, and the Oregon State Board of Health. Recreation facilities and water developments are fenced to prevent livestock and big game from contaminating the areas. Garbage cans are provided for the public's use at all developed sites and some undeveloped sites.

All recreation facilities are maintained to BLM standards. Sanitary facilities are maintained daily on developed sites. Drinking water quality is monitored periodically for contamination.

B. Stream Protection and Fish Habitat Improvement

During the past two years, fish habitat improvement practices have greatly improved in Oregon. Stream clearance on approximately 20 miles of actual project length allows access to at least 1,000 miles of upstream spawning area. In addition to debris removal, falls, bypasses, and culvert replacement have provided access to an additional 100 miles of stream. A new program of spawning gravel replacement held by retaining weirs or gabions will rehabilitate many miles of streams damaged by the 1964 flood.

In addition, an intensive effort is made in management planning to include fish habitat protection and enhancement in all district planning. Road construction can be detrimental to fish habitat and water quality through siltation. Coordinated planning can reduce the impact of road construction and logging to a minimum. Inclusion of streamside buffer strips in logging plans helps to assure necessary stream protection. Good watershed management usually complements fish habitat protection.

The purpose of the program is to preserve or manipulate the present habitat for aquatic animals. Protection and improvement of water quality is a recognized stream improvement function.

Conservation measures include: (a) protecting streamside vegetation including timber, small trees, shrubs, and grass that exists along streams; (b) designing proposed land use projects adjacent to streams to provide for the protection of stream character; (c) controlling public use in areas to protect vegetation or other aquatic habitat; (d) avoiding use of herbicides adjacent to streams; (e) controlling boating on streams to improve or maintain water quality; and (f) controlling operations that cause direct silting or high turbidity in streams. A few of these operations are winter logging and road building, keeping equipment and debris operating in streams, and pollution from mining operations.

Construction practices performed on streams include: (a) restoring habitat destroyed by mining operations, unusual floods or other causes. This practice includes leveling banks where stream courses have been destroyed by activities such as dredging and placer mining, and establishment of trees, shrubs, and grasses along denuded stream banks; (b) fencing stream banks to protect streamside vegetation from livestock grazing; (c) relocating roads and trails when they encroach streams, contribute sediments, or destroy streamside vegetation; (d) stabilizing stream banks by constructing rock riprap or rock filled gabions; (e) placing gabions and other obstructions in streams for fish habitat; (f) restoring or developing artificial and existing rearing grounds by cleaning or adding gravel and excavating pools; (g) placing dams, weirs, and drop structures in streams to reduce stream velocities, hold water in the stream for increased space, hold spawning gravel, create pools, or form sediment basins.

4. Watershed Conservation and Development

The soil and watershed program is practiced to some extent on the 15,658,000 acres administered by the BLM in Oregon. The program has a large impact on rehabilitation of over 13 million acres in eastern Oregon.

The purpose of the program is to apply land treatment and management practices and to install structures which either singly, in combination, or in series, stabilize depleted lands, maintain or restore soil productivity, improve water quality and yield, and reduce damage from surface runoff.

Five conservation measures are employed in this management practice:

A. Chemical Brush and Weed Control. This measure is very important to the range and watershed management program. Nearly 360,000 acres have been brought under control by BLM in Oregon.

The purpose is watershed protection through chemical control measures with reduction of runoff damage as an ancillary benefit. Forage production is a spinoff product. This measure is important in improving water quality through reduction of surface runoff.

B. Hydrologic (water control) Structures. Reservoir construction is of major importance to the watershed and range management programs. BLM has constructed nearly 3,000 reservoirs in Oregon. Only a very few water-spreading systems have been completed in State watersheds.

Dams are constructed for water storage or for rehabilitation of eroded watersheds where land treatment is not applicable. Benefits are water for livestock, wildlife and recreation use, sediment storage, flood control for preventing downstream damage and stream channel erosion. Dikes and water spreading accomplish onsite and offsite benefits, including watershed protection and forage production when revegetation practices are included. These measures directly or indirectly control sediment yields and contribute to perennial streams and improved water quality.

C. Range Seeding. This measure has a very important impact on BLM watershed and range management programs in Oregon. Over 500,000 acres of depleted range lands have been rehabilitated by seeding.

The purpose is to rehabilitate and improve plant cover on depleted lands and wildfire-burned areas having high productive potential. Objectives are to stabilize the soil, reduce erosion from surface runoff, increase water percolation, improve water yield and quality, and improve the soil structure, as well as improve vegetative cover.

D. Watershed Tillage. Only a limited amount of watershed tillage has been completed in the State of Oregon. However, the potential for more use of this measure exists.

Watershed tillage measures, usually accompanied by seeding, involve soil manipulation, molding, or shaping to form ridges, ditches or rips. These provide surface indentions and/or a disturbed soil seedbed. Objectives are to reduce runoff and sediment yield, increase infiltration and soil moisture, hasten restoration of native vegetation, and prepare seedbed for planting selected species. Watershed tillage is an important practice which reduces sediment deposits in intermittant streams.

E. Well and Spring Development. These two activities are important to BLM's range management program. To date 183 wells and 892 springs have been developed in Oregon.

The purpose is to develop water supplies of adequate quality for specified uses. These uses include livestock, wildlife, recreation and fire protection.

5. Fire Protection

The protection of 15 million acres of BLM administered lands in Oregon is accomplished by force account crews and by contract with other protection agencies. The protection program has been successful in reducing the acreage of burned lands. The resulting dramatic losses of soil, fish habitat, permanent improvements, and air and water quality from nearly every fire emphasize the need for protection of land from wildfire.

The purpose is to keep wildfire losses to a minimum and to prevent fire through education, prevention, and enforcement. Reduction of wildfire losses will prevent soil erosion, air pollution, sedimentation and disruption of resource programs.

After a fire is controlled, rehabilitation of the burned area is considered. Small fire areas are not generally treated. Large fires receive varying rehabilitation treatments according to cover, topography, soils, etc. These measures may be: (1) reseeding to grasses and legumes, (2) reseeding to bitter brush, (3) removal of debris in waterways; and include (4) stabilization of stream banks, (5) salvaging of burned timber, (6) water barring of fire trails, (7) seeding to temporary cover crops, (8) collection and disposal of fire hazard debris, and (9) structures to decrease rate of runoff.

6. Minerals Management

Positive minerals management is an integral part of the multiple resource management concept. Accordingly, a major objective of the minerals program of the Bureau of Land Management is to promote the exploration, development and extraction of the mineral resources in consonance with other natural resources, including compatability with environmental values as governed by air and water quality controls.

BLM minerals management is not currently involved in any program in Oregon other than the sale of sand, gravel and stone, which actively affects the status of the land. Most of the projects are concerned with fact finding, completion of a minerals inventory, or the examination of mining claims under the Federal Mining Laws.

Community pits are established for the sale of stone, sand and gravel, and free use permits are issued to Government agencies from other pits. Regulations are in effect for the surface reclamation of the land, in addition to regulations controlling the method used in the mining operations.

National Park Service

The National Park Service administers the following three areas in Oregon:

Natural Areas	
Crater Lake National Park	160,290.33 acres
Oregon Caves National Monument	480.0 "
Historical Area	
Fort Clatsop National Memorial	124.97 "
Total Areas Administered	160,895.30 acres

The administrative policies of the Service have various built-in controls and land management practices that are specifically designed to prevent pollution resulting from development and use.

First, the recommended standards for safety and public health prescribed by Federal, State, or local authorities having jurisdiction are observed in all areas, plus Recreation Advisory Council Circular No. 3, *Policy Governing Water Pollution and Public Health Aspects of Outdoor Recreation*.

Further, the Service's administrative policy utilizes certain specific measures to maintain the quality of waters within or originating within the areas. They include adequate sewage treatment and disposal for all public-use facilities; programs to prevent or correct erosion and soil or vegetation deterioration from unnatural causes; avoidance of contamination by lethal substances such as insecticides; regulation of the intensity of use in certain areas and at certain times as determined necessary through water quality monitoring; and for entering into cooperative agreements with other agencies or governing bodies for cooperative measures to avoid water pollution.

In accordance with the Wilderness Act of 1964 (P.L. 88-577), a substantial portion of Crater Lake National Park is being studied to determine if it may be deemed suitable for inclusion by Congress in the National Wilderness Preservation System. Under wilderness use and management policy, only those structures, management practices, and uses necessary for management and preservation of wilderness qualities are permitted. Pollution potential resulting from this use and management policy is minimal. In fact, the major portion of this park has been so managed since its establishment in 1902.

To achieve the purposes of natural and historical areas--namely, preservation and appropriate public use--planning and management recognize the need for development such as transportation arteries, utility and communication corridors, consumptive resource uses, and residential, commercial, and recreation land uses. Any potential for pollution exists chiefly in connection with these relatively small development enclaves where public use tends to concentrate.

The kinds of land management practices and conservation measures being conducted by the National Park Service are summarized in Table 3.

NATIONAL PARK SERVICE

TABLE 3
LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

LAND MANAGEMENT PRACTICES	CONSERVATION MEASURES																					
	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT *			X																			
RANGE MANAGEMENT																						
STREAM PROTECTION																					X	
WATERSHED MANAGEMENT																						
FIRE PROTECTION		X		X																		
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE	X	X		X																		
OUTDOOR RECREATION DEVELOPMENT	X	X	X	X	X	X											X				X	X
WILDLIFE MANAGEMENT																						
POWER LINE CONSTRUCTION		X		X																		
CANAL & RESERVOIR MANAGEMENT																						
CROPLAND MANAGEMENT																						

X = Existing

*NPS manages forests as part of whole ecological systems in the natural areas. It does not manage "timber", as such, except as may be authorized under certain circumstances in national recreation areas.

Bonneville Power Administration

The BPA distributes its power through a high-voltage grid system. This network recently was enlarged in Oregon by the installation of more than 200 additional miles of power line. An experimental, direct current transmission line also has been built in the State. The BPA plant investment in Oregon totals more than $180 million, including 3,758 circuit miles of power lines and substations. All transmission lines are on easements. BPA owns only 3,104 acres of land, mostly substation sites (2,725 acres).

The kinds of land management practices and conservation measures handled by these contracts are summarized in Table 4.

BONNEVILLE POWER ADMINISTRATION

TABLE 4
LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT																						
RANGE MANAGEMENT																						
STREAM PROTECTION																						
WATERSHED MANAGEMENT																						
FIRE PROTECTION																						
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE	X	X		X			X								X							
OUTDOOR RECREATION DEVELOPMENT																						
WILDLIFE MANAGEMENT																						
POWER LINE CONSTRUCTION	X	X		X														X			X	
CANAL & RESERVOIR MANAGEMENT																						
CROPLAND MANAGEMENT																						

X = Existing

Bureau of Indian Affairs

Indian lands in Oregon are located on two reservations (Warm Springs, Umatilla), the burns-Paiute Colony, The Dalles Public Domain Allotments, and one non-reservation school (Chemawa) comprising a total of 670,161 acres. There are 47,272 acres of agricultural land; 350,984 acres of forests; 242,854 acres of open grazing; and 29,051 acres of wildlands. Of this total area, 490,772 acres are tribally owned, 178,237 acres are individually owned, and 1,152 acres are government owned. The tribal and individual lands are held in trust by the United States Government. This trust responsibility does not extend in a guardian-ward type relationship. Indian lands are owned by Indian tribes and individual Indians. For purposes of this report, these Indian trust lands are not considered to be Federal lands.

A number of conservation measures are accomplished on Indian lands. Chemicals are used to control brush. The Secretary of the Interior has imposed stringent rules for the conduct of this operation. Each year all agencies prepare a program on use of chemicals. These programs are screened by an Area Committee and submitted to the FWPCA in Washington, D.C. Prior to initiating the chemical control program at the field level, the FWPCA Committee in Washington, D.C. has to approve the operation. Brush control is the only listed conservation measure requiring this type of programming.

Income from the sale of timber makes up approximately 90% of tribal income in the area. It is used to finance many tribal programs, including land consolidation, education, welfare, credit, law and order, dividend payments and Bureau activities which include preparation and administration of timber sales, the protection of property from wildfires and other destructive agents, and the maintenance and improvement of the productive character of the forest property. The necessary means providing meaningful assistance and encouragement to Indians in timber-oriented endeavors must all be programmed on a long-range basis to sustain tribal income and programs of the magnitude involved.

An erosion hazard is present during the timber harvest and shortly thereafter, similar to other forested lands. Tribal and Bureau funds are used to reseed and plant the disturbed areas and access roads. In addition, the Bureau assists the Indian owners in monitoring their contracts to minimize the amount of soil lost from the area and finding its way into streams and reservoirs.

The Range Management Program is designed to assist Indian families in developing economically sound livestock enterprises centered around the use of reservation range lands. To systematize management, protection and development of such lands, the range is divided into range units. Grazing permits are issued to each stockman based on his specific livestock enterprise, the needs of the range and recognition of the impact of grazing use on the other basic resources including soil, forest, water and recreation. The Umatilla Reservation is the only area in which the grazing permit practice is followed.

The Roads Program of the Bureau is to provide an adequate system of roads for Indian areas in order that community and economic development programs can progress as rapidly as possible and allow full benefits to Indians. Approximately 86% of the reservation road system is substandard and inadequate for safe all-weather travel. These roads provide school bus transportation, farm-to-market travel, intercommunity travel, recreation and general travel needs essential to the development of reservation economy and improvement of reservation communities. The Bureau roads system for the most part is no different than non-Bureau rural roads.

The kinds of land management practices and conservation measures being conducted on these Indian lands are summarized in Table 5.

BUREAU OF INDIAN AFFAIRS

TABLE 5

LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT	X	X	X	X													X					
RANGE MANAGEMENT	X	X	X		X	X	X	X	X	X								X				
STREAM PROTECTION																						
WATERSHED MANAGEMENT	X	X				X	X			X												
FIRE PROTECTION	X		X																			
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE	X	X				X	X										X	X				
OUTDOOR RECREATION DEVELOPMENT	X	X	X		X	X	X							X	X	X		X	P	X	X	
WILDLIFE MANAGEMENT	X				X																	
POWER LINE CONSTRUCTION																						
CANAL & RESERVOIR MANAGEMENT	X																				X	
CROPLAND MANAGEMENT	X	X	X			X				X	X	X	X									

X = Existing P = Potential or Anticipated

Of the 1152 acres of government-owned lands approximately 560 are farmed. The remaining 892 acres are located at the agency headquarters and are used for housing and office buildings. Sewage, fertilizer, and some sediment are the primary pollutants. Approximately 300 acres are farmed or grazed at Chemawa.

Bureau of Reclamation

Lands withdrawn by USBR Regions in Oregon are:

Region 1	135,250 acres
Region 2	103,099 "
Total	238,349 acres

Conservation practices include:

Seeding for canal or river bank stabilization.

Seeding range lands for wind erosion.

General land management consists of:

Provisions for proper grazing practices in areas leased.

Provisions for proper farming practices in agricultural leases.

Regulation of chemical weed control according to Federal and State requirements.

Support research to provide better land use.

Support research to promote control of nematodes.

Provisions to prevent siltation and preserve land in natural condition in miscellaneous leases and permits for taking materials and other land uses.

BUREAU OF RECLAMATION

TABLE 6

LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY *

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND CABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT																						
RANGE MANAGEMENT																						
STREAM PROTECTION	X				X					X												
WATERSHED MANAGEMENT	X																					
FIRE PROTECTION																						
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE	X	X		X			X	X		X												
OUTDOOR RECREATION DEVELOPMENT																					X	X
WILDLIFE MANAGEMENT																						
POWER LINE CONSTRUCTION	X	X		X		X																X
CANAL & RESERVOIR MANAGEMENT	X	X	X	X	X	X	X			X				X		X		X			X	X
CROPLAND MANAGEMENT		X	X	X		X				X		X										

X = Existing

* No power lines constructed or anticipated in the State of Oregon.

Water quality monitoring is conducted and includes:

(a) Recorders to monitor salinity at Pumping Plant F discharging from Klamath Straits drain into Klamath River, and an additional recorder moved to various points within the project as the need is indicated.

(b) Monthly monitoring at nine sites of temperature, turbidity, pH, nutrients, dissolved oxygen, and electrical conductivity and semi-annual samples of common chemical ions.

(c) In addition, over a period of years, salinity analyses of soil and water within the project have been made as a check on salt balance.

The kinds of land management practices and conservation measures being conducted by the Bureau of Reclamation are summarized in Table 6.

Bureau of Sport Fisheries and Wildlife

The kinds of management practices and conservation measures conducted by the Bureau are summarized in Table 7.

These activities are carried out under three Bureau programs--namely, wildlife refuges, fish hatcheries, and Federal aid. The latter program is described in Chapter III.

1. Refuge Land Management Program

The refuge system contains eleven areas within the State of Oregon. Names, location, size and objectives of these areas are provided below:

Cold Springs and McKay Creek National Wildlife Refuges are administered from McNary National Wildlife Refuge headquarters in Burbank, Washington. Cold Springs is a 3,000 acre refuge superimposed upon an irrigation reservoir 6 miles east of Hermiston, Oregon. Very little land management is accomplished here because opportunity is limited. McKay Creek is a 1,836 acre refuge located 7 miles south of Pendleton, Oregon. To achieve an objective of accommodating thousands of waterfowl during migration, approximately 200 acres of land are farmed to produce grain.

Malheur National Wildlife Refuge encompasses 180,850 acres and is located 32 miles southeast of Burns, Oregon. The refuge serves primarily as a nesting and resting ground for migratory waterfowl. An extensive grazing and haying program occupies most of the managed upland. Water management capability allows manipulation of waters over meadows and diked areas. Some impoundments are kept dry each year to facilitate planting of grain crops. About 1,750 acres of upland are intensively managed for crop production.

TABLE 7
LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT																						
RANGE MANAGEMENT		X			X	X	X		X													
STREAM PROTECTION																						
WATERSHED MANAGEMENT																						
FIRE PROTECTION																						
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE																						
OUTDOOR RECREATION DEVELOPMENT		X			X	X											X				X	
WILDLIFE MANAGEMENT	X		X		X													X				
POWER LINE CONSTRUCTION																						
CANAL & RESERVOIR MANAGEMENT																						
CROPLAND MANAGEMENT	X	X	X		X	X				X			X									

X = Existing

Hart Mountain National Antelope Refuge is an area in southwestern Oregon of 241,076 acres dedicated to insure preservation of the antelope. Headquarters are about 64 miles northeast of Lakeview, Oregon. Land use is confined to a range management program of grazing, brush control, range seeding, and water improvements.

Umatilla National Wildlife Refuge is a newly designated refuge located on both sides of the Columbia River in the vicinity of Boardman, Oregon. The primary objective is to provide food and protection for migrant and resident waterfowl. Irrigated farm crops will become a part of the land management program to increase food production for waterfowl.

Upper Klamath and Klamath Forest National Wildlife Refuges are a part of the Tule Lake National Wildlife Refuge complex located in the Klamath Basin. The Upper Klamath, containing 12,500 acres, and Klamath Forest, containing 15,200 acres, rank as some of the best waterfowl production areas in the Nation. Haying and grazing are the principal land use endeavors employed on these two refuges.

William L. Finley National Wildlife Refuge Complex is a newly acquired area. This includes three refuges: William L. Finley Refuge with an approved size of 5,370 acres, Ankeny Refuge approved for 2,858 acres, and Baskett Slough Refuge will be 2,436 acres in size. Headquarters are located about 11 miles south of Corvallis, Oregon. Objectives are to provide fall and winter habitat and food for waterfowl. Intensive management of agricultural lands totaling approximately 4,350 acres is presently undertaken to provide waterfowl food, usually in the form of cereal grains and green browse.

2. Fish Hatcheries Program

The Bureau administers the Eagle Creek National Fish Hatchery in Clackamas County for producing coho salmon and steelhead trout. In a typical year, Eagle Creek distributes more than 5,500,000 salmon and 600,000 steelhead to Oregon waters. There are 11 other hatcheries in the State of Oregon which are funded with Federal funds, but only one, the Eagle Creek National Fish Hatchery, is operated by BSF&W. These other hatcheries are operated by the Oregon Fish Commission.

Bureau of Mines

The Bureau of Mines is not a land managing agency. The Bureau conducts programs designed to conserve and develop mineral resources and to promote safety and healthful working conditions in the mineral industries. Its functions are twofold--mineral resource evaluation and metallurgy research and development.

Under the Solid Waste Disposal Act, responsibility for Federal efforts to control wastes of mineral origin has been vested in the Bureau of Mines.

The extent and variety of mineral wastes, the amount of valuable surface space they occupy, and the contribution they make to air and water pollution have been broadly determined in preliminary Bureau studies. One comprehensive investigation, already completed, disclosed no less than 85 separate factors underlying the rapid accumulation of junked automobiles in various parts of the country. The Bureau's report, "Automobile Disposal: A National Problem," is serving as a valuable guide to industry and State and local officials who are working toward solutions to this problem.

The Bureau of Mines also was the coordinator of, and principal contributor to, a major governmental study of current surface mining practices and their effect on our environment. The report on this study, titled "Surface Mining and Our Environment," provided the basis for legislative proposals designed to insure proper restoration of lands scarred in satisfying our increasing requirements for essential minerals and fuels.

In attacking the problems of mineral waste, the Bureau of Mines utilizes the skills and experience of its own scientists, engineers, and mineral economists. Also, through contracts and grants to universities, research groups, and other qualified organizations, it has tapped the large pool of talent and expertise that exists outside of government.

Geological Survey

The Geological Survey is not a land managing agency, nor does it operate any facility where the possibility of pollution of water resources would be a factor. The USGS is a fact finding agency. Its surveys, investigations, and research, however, do provide a basis for the land managing agencies in establishing a conservation measure and in understanding the alterations taking place in the environment.

Location and conservation of available water supplies is a particularly important aspect of water resource management in the semi-arid public lands of Oregon. Effective management requires extensive knowledge of areal hydrology, of soil-plant-water relationships, and of effects of land treatment on water yield, sediment movement, and water loss. The Geological Survey is cooperating with other agencies in the Department, notably Bureau of Land Management, and to a limited extent with State agencies, in conducting research and areal investigations to provide such information. Likewise, hydraulic and hydrologic characteristics of stream systems, sedimentation conditions in watersheds, water quality investigations and related pollution-oriented studies provide a better decision base for management agencies.

An example of current USGS cooperation is the Alsea Watershed Study--a research project to determine the effects of logging practices on streams and aquatic resources. The study area includes three watersheds near Waldport, Oregon. The water resources investigations program of the USGS consists of the collection of basic information through a hydrologic data network, areal hydrologic or interceptive studies, and research.

The Geological Survey also supervises oil, gas, and mining operations under lease on Federal and Indian lands and the Outer Continental Shelf. Lease terms and regulations require lessees to conduct their oil and gas and mining operations in a manner to avoid, minimize, or correct damages to the environment including water pollution. If a water pollution problem exists, the lessee may be required to install a suitable monitoring system and to keep records of the quantity and quality of water used and waste water disposed of.

The Office of Minerals Exploration, a unit of the Geological Survey, administers the Minerals Discovery Loan Program which was authorized in 1958 by P.L. 85-701. Although not specifically a requirement of the Act itself, the Interior Department for some years has had a firm policy regarding protection of the environment. In every contract that involves exploration by trenching methods, language requires the operator to backfill the trenches and restore the land surface as a part of the job.

Bureau of Commercial Fisheries

The Bureau of Commercial Fisheries is not a land managing agency, nor does it operate any facilities which would have an impact on water quality. The Bureau serves as a contractor to fund other land managing agencies in projects to enhance the quality and abundance of fish resources in the State.

Among these projects is the Columbia River Program, a cooperative effort which also involves Washington and Idaho, to maintain the Columbia River system as an important salmon, steelhead trout, and resident game fish producing area for commercial or sport fishing. This extensive program includes the construction and improvement of State and National hatcheries, the establishment of new salmon runs, a general program of stream improvement, the evaluation of proposed construction projects to determine their effects on fish and a long-range study to find ways to pass migratory fish around high dams.

The new multimillion dollar fishway at Willamette Falls is a recent example of the Bureau's financial and technical assistance to improve water passages for anadromous fish. A TV camera and video tape equipment were installed at the Willamette Falls Fishway to count fish. This new method of recording fish passage was developed primarily by BCF.

Bureau of Outdoor Recreation

The Bureau manages no lands, recreation areas, or facilities. It provides a focal point for outdoor recreation programs and related activities in the Federal Government and serves as a point of contact on recreation matters between the State of Oregon and the Federal Government.

Through detailed studies of water resources, the Bureau assists in selection of recreational development sites, road locations, and capital improvement costs. These functions are evaluated to determine what effects their installation will have on the environment. Evaluation criteria include concern for air and water pollution, soil erosion, aesthetics, and natural beauty. The Bureau studies and makes recommendations on rivers to be included in the national wild and scenic rivers system to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

FWPCA Activities

The Federal Water Pollution Control Administration, U. S. Department of the Interior, is the principal water pollution control agency of the Federal Government. The Administration, as directed by Congress in the Federal Water Pollution Control Act, is dedicated to a strong program of pollution control and abatement throughout the country. The Pacific Northwest Region is one of nine FWPCA regions in the Nation. Each region is headed up by a Regional Director who reports to the Commissioner of the FWPCA in Washington, D.C.

The broad objectives of the FWPCA, as stated in the Federal Water Pollution Control Act, are "to enhance the quality and value of our water resources and to establish a national policy for the prevention, control, and abatement of water pollution." These objectives are being met through programs designed to foster Federal, State, and municipal cooperation. The FWPCA provides technical and financial assistance and makes available the results of its research in pollution control and advanced waste treatment processes.

CHAPTER III

IDENTIFICATION OF GRANTS AND CONTRACTS HAVING AN IMPACT ON WATER QUALITY

Some of the above-mentioned land practices and conservation measures are being carried out under Federal grants, contracts, and loans, and thus are subject to the procedures established in Executive Order 11288.

Grants

The kinds of grants being administered by agencies in the pilot review include:

1. Outdoor Recreation Financial Assistance--Authorized by the Land and Water Conservation Fund Act of 1965 and administered by the Bureau of Outdoor Recreation. Financial assistance is

OUTDOOR RECREATION GRANTS

TABLE 8
LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT																	X					
RANGE MANAGEMENT																						
STREAM PROTECTION		X														X	X	X				
WATERSHED MANAGEMENT																X		X				
FIRE PROTECTION																						
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE		X		X		X										X	X					
OUTDOOR RECREATION DEVELOPMENT	X	X	X	X	X	X	X			X						X	X	X				
WILDLIFE MANAGEMENT	X																					
POWER LINE CONSTRUCTION																						
CANAL & RESERVOIR MANAGEMENT		X																				
CROPLAND MANAGEMENT																						

X = Existing

available to Oregon and its political subdivisions for planning, acquiring, and developing all types of outdoor recreation areas and facilities. The kinds of land managing activities being carried out under these grant programs are shown in Table 8.

2. Fish and Wildlife Restoration--Authorized by the Dingell-Johnson and Pittman-Robertson Acts which are administered by the Bureau of Sport Fisheries and Wildlife. The State fish and game department (Oregon State Game Commission) receives financial assistance to protect and restore wildlife and the sport fishery resources. The kinds of land managing activities being carried out under these grant programs are shown in Table 9.

FISH & WILDLIFE GRANTS

TABLE 9
LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT	X			X																		
RANGE MANAGEMENT	X	X	X		X	X	X		X	X		X										
STREAM PROTECTION																		X				
WATERSHED MANAGEMENT	X													X								
FIRE PROTECTION		X		X																		
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE							X															
OUTDOOR RECREATION DEVELOPMENT					X	X				X											X	
WILDLIFE MANAGEMENT	X	X	X		X	X	X		X	X		X		X				X	X	X	X	
POWER LINE CONSTRUCTION																						
CANAL & RESERVOIR MANAGEMENT																						
CROPLAND MANAGEMENT	X	X	X						X			X										

X = Existing

Contracts

Numerous kinds of contracts are made. They are summarized below:

FEDERAL AGENCY	TYPES OF CONTRACTS											
	CLEARING & ACCESS ROAD CONSTRUCTION	TIMBER SALES	GRAZING LEASES	MINING LEASES	HYDROLOGIC CONSTRUCTION PROJECTS	CHEMICAL BRUSH & WEED CONTROL	CONCESSIONS	IRRIGATION	SPECIAL USE PERMITS	TRANSMISSION LINE CONSTRUCTION	HATCHERY OPERATIONS	FARMING LEASES
BLM	X	X	X	X	X	X			X			
NPS	X	X[1]					X		X			
BIA	X	X	X			X		X				X
BPA	X	X								X		
BCF											X	
BR	X	X	X		X	X		X		X		X
BSF&W	X				X	X			X			X

[1] Timber sales contracts in natural areas issued only subject to special authorization and where clearly justified by reason of disease control and road or other construction. Timber disposal not permitted in national park and monument wilderness areas.

Seven of the Federal agencies in this pilot review are involved in some type of contract(s) in which operations have an impact on water quality. The kinds of land management practices and conservation measures being carried out under these activities are identified in Table 10.

Loans

Only one loan program was identified--small reclamation project loans for water resource projects for irrigation. The projects may include other minor purposes of municipal and industrial water, flood control, hydroelectric power, fish and wildlife enhancement, and recreation development. The loan program is administered by the Bureau of Reclamation.

The kinds of activities being carried out under this loan program which have an impact on water quality are shown in Table 11.

FEDERAL CONTRACTS

TABLE 10
LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT	X	X	X	X						X				X	X	X	X	X				
RANGE MANAGEMENT	X	X	X		X	X	X	X	X	X	X		X			X	X	X				
STREAM PROTECTION	X					X			X	X				X	X	X	X	X	X		X	
WATERSHED MANAGEMENT	X	X	X		X	X	X	X	X	X	X		X		X	X	X	X				
FIRE PROTECTION	X	X	X	X	X		X		X					X								
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE	X	X		X		X	X			X				X	X		X	X	X			
OUTDOOR RECREATION DEVELOPMENT	X	X	X	X	X	X	X			X				X	X	X	X	X	X		X	X
WILDLIFE MANAGEMENT	X		X		X	X	X	X	X	X	X			X	X	X	X	X	X	X		
POWER LINE CONSTRUCTION	X	X		X														X			X	
CANAL & RESERVOIR MANAGEMENT	X	X	X			X	X							X		X		X			X	
CROPLAND MANAGEMENT	X	X	X			X				X	X	X	X									

X = Existing

RECLAMATION SMALL PROJECT LOANS

TABLE 11
LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES HAVING AN IMPACT ON WATER QUALITY

	CONSERVATION MEASURES																					
LAND MANAGEMENT PRACTICES	SEEDING & PLANTING	BRUSH AND WEED CONTROL	PEST & DISEASE CONTROL	SLASH BURNING & DISPOSAL	WATER DEVELOPMENT	FENCING	CATTLE GUARDS	STOCK TRAILS	GRAZING SYSTEMS	HYDROLOGIC STRUCTURES	WATERSHED TILLAGE	IRRIGATION	FERTILIZING	STREAM DEBRIS REMOVAL	STREAMSIDE BUFFER STRIPS	BANK LEVELING	ROAD & TRAIL RELOCATING	ROCK RIPRAP AND GABIONS	SPAWNING GRAVEL REPLACEMENT	FISH HATCHERIES	SANITATION CONTROLS	PEOPLE CONTROLS
TIMBER MANAGEMENT																						
RANGE MANAGEMENT																						
STREAM PROTECTION	X																					
WATERSHED MANAGEMENT	X																					
FIRE PROTECTION																						
MINERALS MANAGEMENT																						
ROAD CONSTRUCTION AND MAINTENANCE																						
OUTDOOR RECREATION DEVELOPMENT																					X	
WILDLIFE MANAGEMENT																						
POWER LINE CONSTRUCTION																						
CANAL & RESERVOIR MANAGEMENT	X	X	X		X	X	X			X				X		X		X			X	
CROPLAND MANAGEMENT		X										X										

X = Existing P = Potential or Anticipated

****

It appears that the land practices and measures being conducted under most grants, contracts, and loans already take into account the protection of water quality. These regulations are fairly specific and provide a vehicle for strict enforcement. Despite Department of the Interior directives on this matter, however, there are still contracts being let which contain no requirements for water quality control.

CHAPTER IV

MANAGEMENT PROCEDURES AND COORDINATION OF LAND PRACTICES AND CONSERVATION MEASURES

Many management procedures can and do add to the pollution potential and problems of water quality control. This part of the review outlined the procedures and coordinating mechanisms currently being used by the operating agencies to carry out their land management practices; it constitutes only a general screening at best.

The control of water pollution through improved land management procedures is severely handicapped by lack of knowledge. The Task Group recognizes that the entire scope of land management procedures needs in-depth and continuing analysis, as there is plenty of room for improvement.

Solutions are not at hand for many of the pollution problems of today's land management practices. Practical answers can be found for some of the current problems from research already completed, but there is need for additional basic research of many kinds.

A major reason for conservation measures not achieving best results in the past has been that insufficient study was made of the proposed site in relation to the way in which the measure was expected to perform. There has been too much generalization in applying these measures. Through experience, it has been found that each proposed site and measure must be judged on its own merits and management practices and resource conservation measures will continue to improve with better staffing and more research results.

Bureau of Land Management

Timber management practices of the Bureau of Land Management are designed to promote permanent forest production consistent with the principles of multiple use management. The Bureau's timber harvest program is directed primarily to the harvest of old growth timber. The volume of timber harvested annually is based upon the sustained yield capacity of the forest property as expressed through the allowable cut.

The systematic harvest of the timber requires an extensive road system to serve the forest property. Under prevailing technology, about six miles of road per section (640 acres) are needed to adequately serve the resources. Road planning is projected on this basis.

In the harvest of the forest resource the Bureau uses two basic types of harvest: the clear cut system whereby all trees upon an area (generally 20-45 acres) are cut, and the partial or selective cut system whereby individual trees are selected for harvest. The method chosen depends upon timber type, topography, and management objectives.

Two basic yarding systems are commonly used in harvesting timber. These are tractor yarding where crawler-type tractor equipment is used to yard logs to a common point for loading, and cable-type systems whereby logs are yarded to a common point by winches in a fixed position. The choice of system is generally dependent upon harvest method and topography. Cable systems are generally used with clear-cut systems in severe topography and tractor yarding is used with partial-cut systems on gentle topography. The Bureau frequently stipulates the type of yarding system to be used, depending upon the topography and silviculture treatment desired to promote good forestry practices. Cable logging may be either "downhill" or "uphill". It is generally conceded that "uphill" cable logging is less damaging to the site than "downhill" cable logging. The Bureau favors uphill cable logging and designs its development patterns to meet this criteria. However, under certain circumstances, downhill cable logging is permitted when it is the only effective way to remove the timber.

Less soil movement is created if logs are lifted entirely off the ground. To accomplish this, BLM has commenced to do some skyline logging. In this method logs are lifted off the ground and yarded through the air on a cableway. Skyline logging may also reduce the amount of road needed for logging.

Logging of old growth timber results in soil disturbance and accumulation of debris. In order to minimize adverse effects of logging practices, the Bureau undertakes the following:

1. Requires timber sale purchasers to submit a logging plan prior to any operation on the contract. This enables Bureau personnel to review contract requirements with the purchaser and to make the purchaser aware of Bureau objectives for the harvest program.

2. Controls location, method of construction, time of construction and use of logging roads under the terms of the timber sale contract.

3. Prohibits use of unsurfaced roads during adverse (wet) weather conditions.

4. Requires fire trails and temporary roads, including skid roads, to be water-barred to properly disperse water.

5. Requires streams, draws and other critical areas to be cleaned of logging debris.

6. Regulates the use of logging equipment.

7. Requires disposal of slash by burning, or otherwise, to reduce fire hazards and to prepare the site for reforestation.

Following timber harvest, the Bureau either seeds or plants the logged area to commercial tree species to hasten reforestation.

Existing range management procedures are adequate to accomplish multiple use objectives on public lands through scientific management of livestock grazing and development of facilitating projects. Regulations provide for the utilization of forage by livestock after consideration has been given to soil and watershed protection, wildlife and other multiple use demands.

Authority is provided to determine the livestock operation and range management practices necessary to improve soil, water, and vegetative resources. Authority includes licensing the number and kind of livestock which can use an area and specifying the season and length of time grazing will be allowed. Constraints are imposed upon livestock grazing to insure that a proper balance with other uses is maintained.

Existing procedures provide for the development of allotment management plans which incorporate grazing management systems. A grazing system is an orderly sequence of grazing designed to accomplish specific resource management and livestock production objectives. Resource objectives include what can be done to improve the soil, water, and vegetative resources by manipulating livestock. Examples are: to increase the quality and quantity of perennial grass species to reduce soil erosion, increase water infiltration, reduce surface runoff from snow pack and heavy rain and provide a more constant and dependable season and perennial flow of high quality water.

Procedures also provide acceptable means to evaluate effectiveness of management in meeting the objectives. This is accomplished through studies which reflect changes in vegetation and related resources. Study results are evaluated, and grazing adjustments made, to accelerate the rate resource management objectives are obtained. Development projects are constructed to facilitate management and complement various management techniques.

Recreation development procedures include a continuing inventory process by which new sites are evaluated and existing inventory reports updated. The best available estimate is that approximately 30 percent of all sites on public lands have been identified and evaluated.

Development procedures include the following:

(1) Development priorities are given to areas having recreation use but no sanitary facilities.

(2) Development plans are submitted for review by the Oregon State Board of Health and Federal Water Pollution Control Administration.

(3) Recreation facilities are constructed to BLM specifications. Running streams and bodies of water must be protected from pollution.

(a) Sanitary facilities must protect groundwater from pollution. Example: All toilets must be at least vault type!

(b) Water used for human consumption must meet standards established by the United States Department of Health, Education, and Welfare, and the Oregon State Board of Health.

(c) Recreation facilities and water developments are fenced to prevent livestock and big game from contaminating the areas.

(d) Garbage cans are provided for the public's use at all developed sites and at some undeveloped sites.

In maintenance:

(1) All recreation facilities are maintained to BLM standards.

(2) Sanitary facilities are maintained daily on developed sites.

(3) Drinking water quality must be monitored periodically for contamination.

Management procedures for stream protection and wildlife habitat improvement include: Coordination with State and Federal agencies concerned with water quality. They are consulted in advance of improvement projects to coordinate work with existing programs. These agencies are: Federal Water Pollution Control Administration, U. S. Geological Survey, U. S. Soil Conservation Service, U. S. Public Health Service, U. S. Fish and Wildlife Service, State pollution authority, State public health authority, State water resources authority, and State fisheries and game agencies.

Stream surveys are made to determine needs for stream management and improvement. Plans are developed for stream management, development and construction projects to improve water quality for specific desirable aquatic animals.

BLM's wildlife program includes the management of fish habitat and is closely allied with other multiple use. A resume of stream protection and fish habitat improvement is shown on pages 12-14 in the BLM report of March 1969 to the FWPCA.

Anadromous and resident fish, especially salmonoids, require a constant supply of clean and unpolluted water if they are to survive. Water quality criteria for BLM administered lands will not knowingly be below the State standards approved by FWPCA. The Bureau's primary involvement in prevention of water pollution is in sediment and temperature control. Close coordination between logging, road building and fish habitat management is maintained to assure protection of the aquatic habitat from silt pollution and temperature increases.

Close liaison between State and Federal wildlife agencies is assured through cooperative agreements and memorandums of understanding. Some of the more important fish habitat enhancement programs are as follows:

(1) Stream clearance and improvement practices have been developed through cooperation with State Game and Fish Commissions. Log jam and debris removal has been a necessity, both from the aspect of assuring fish passage and preventing destruction of downstream facilities, such as culverts, bridges, and roads. Falls bypass or removal and culvert replacement or modification projects have been initiated to allow passage of anadromous fish. These projects have State fish and game agency approval and participation.

(2) Stream improvement practices, including the placement of gabions and weirs to make resting pools or to hold spawning gravel, are conducted also in cooperation with State fish and game agencies.

(3) Terrestrial improvement practices include the seeding and fertilization of cut banks and fills to assure soil stabilization and the protection of water quality.

Procedures in watershed management vary with the kind of conservation measure employed. These procedures are outlined below:

A. Chemical Brush and Weed Control

(1) Selection of Site. Areas selected for treatment must have potential for natural revegetation. Vegetation may not be removed on steep slopes, rough terrain, stream borders, or areas where aesthetic values are important. Spraying may not be done within one mile of the hazard areas when using aircraft operating at speeds less than 100 mph. This requirement is increased to three miles for aircraft operating at speeds over 100 mph. Hazard areas are agricultural crops, running streams, large bodies of water, or any area posing a threat to human health, domestic animals, or fish and wildlife.

(2) Coordination

(a) Areas selected for treatment are reviewed by public interests and the Oregon Game Commission for recommendations.

(b) All spraying projects are approved by the Federal Committee on pest control.

(3) Practice Application

(a) Chemicals and amounts selected for use are registered with the Department of Agriculture.

(b) Water or oil are used as carriers for application. Oil may only be used in remote areas and in cases where there is no effect on wildlife. Emulsifying agents must be added if the chemical does not contain one.

(c) Areal application is done according to BLM specifications.

(d) Contractors may not pollute waters by extracting water from streams or bodies of water for spraying purposes. They must clean up all work sites which might create sanitation problems or cause water pollution.

(4) Livestock Management

(a) Livestock grazing must be deferred on areas treated by chemicals for one year.

(b) Areas rehabilitated by brush control are managed intensively to protect the watershed.

(5) Protection. All treated areas are given fire protection.

B. Hydrologic Structures

(1) Site Selection. Sites for dam construction are selected on the basis of opportunities for reducing water velocities or erosion control, impoundment size for water and silt storage, hydrologic water yields, spillway site, and water holding and construction capabilities of the soil. Waterspreading system sites are selected on the basis of onsite watershed improvement needs, and the downstream protection benefits.

(2) Construction Practices

(a) Water filing permits are received from the Oregon State Engineer on all reservoirs impounding water.

(b) Projects are designed and constructed according to BLM specifications.

(c) All impoundment areas are cleared of vegetation or debris.

(d) Reservoirs having wildlife or recreation benefits are fenced from livestock to prevent water contamination.

(e) Contractors are required to clean up construction sites after completion of projects.

(f) Projects are maintained when necessary to assure proper operation.

C. Range Seeding

(1) Site Selection

(a) The vegetation type must be identified to determine the need for seeding. Vegetation that will compete with seeded species must be eliminated.

(b) Soils are identified to determine their productivity. Important considerations are soil depth, texture, stability, and pH factor.

(c) Seeding can only be accomplished on slopes of 20 to 30 percent. The area must be relatively rock-free.

(d) Hydrology and erosion studies are made on sites where seeding is necessary to reduce soil erosion and control surface runoff.

(e) Climate studies are necessary to determine seeding success.

(2) Coordination. Areas selected for treatment are reviewed by public interests and the Oregon Game Commission for recommendations.

(3) Project Execution

(a) Seedbed Preparation. Competing vegetation is reduced by methods of plowing, spraying, chaining, crushing, burning, cutting, bulldozing and harrowing. Selection of method is determined by site and vegetation conditions. All treatments are done on the contour to prevent accelerated erosion before seeding establishment.

(b) Seeding methods include drilling and broadcasting. Broadcasting is recommended only under certain conditions such as after chaining of juniper. Drilling must also be completed on the contour.

(c) Seeded Species. Adapted species are selected for watershed protection and management needs. Wildlife species are also seeded when desirable.

(d) Livestock Management. All seedings are protected from livestock grazing for two years to permit seeding establishment. Seedings are managed intensively to protect the watershed.

(e) Protection. Seedings are protected by the district fire program.

D. Watershed Tillage

(1) Site Selection is determined by the need for treatment and the climatic, soil and topographic limitations. The method of treatment is selected when it is necessary to reduce any combination of the following effects:

(a) Sheet and rill erosion exists because insufficient ground cover existed to intercept rainfall or impede surface runoff.

(b) Low infiltration limits water intake of soil.

(c) Surface detentions (roughness) do not materially impound or impede runoff.

(d) Leaching salts are necessary to encourage plant growth and promote soil stabilization.

(e) Increasing soil moisture is necessary for the growth of vegetation.

(f) Improving seedbed conditions where seeding is required.

(g) Excess surface water must be removed from an area.

(2) Treatment Design. The type and treatment and intensity are determined by objectives and the hydrology of the area. Example: trench size, depth and length, and spacing intervals.

(3) Treatment Practices. All types of treatment are constructed or performed according to BLM specifications.

(a) Treatments are performed on the contour of the land.

(b) Equipment operation zones destroy some of the natural vegetation. These areas are seeded to reduce erosion.

E. Well and Spring Development

(1) Well investigations are made by the USGS on all proposed well sites before drilling.

(2) Wells and springs are developed according to BLM specifications. The following procedures are discretionary, but are proposed for adoption as regulations:

(a) Provide removal of surface drainage from the site to prevent contaminated material from entering the site.

(b) Construct a suitable fence of at least 100 feet from the water source to prevent big game and livestock from entering the site.

(c) Provide access to the spring (sealed headbox) for maintenance, but prevent indiscriminate access to the box by a suitable locking device.

(3) Water used for human consumption must conform to standards established by the United States Department of Health, Education, and Welfare and the Oregon State Board of Health.

Stable watersheds are essential to many of BLM's program activities. The Bureau's soil and watershed conservation effort maintains and develops the soil and water resource base which serves as the foundation for the multiple uses of the public lands.

Soil and watershed conservation under the multiple use concept requires that needed conservation measures be fully coordinated with all related Bureau activities. This program, coupled with expanded intensive management programs, such as range, wildlife, and forest management will contribute to the maintenance of a vigorous and healthy plant cover essential to good watershed management.

Fire protection on BLM administered lands in Oregon is accomplished by contract with the State Board of Forestry for 2,397,000 acres in western Oregon and by BLM force account crews for 13,261,000 acres in eastern Oregon. Fire management varies somewhat by the difference in topography, vegetation, and available resources between eastern and western Oregon. Crews are taught to proceed rapidly to all reported fires and to make every effort to control the fires before a major heat buildup occurs.

The trend is for greater reliance upon aircraft in the initial attack. Aerial attack consists of helicopter or fixed-winged dropping of slurry to retard the fire when it is small. Aerial tanker drops will continue through the early stages of control to supplement ground attack.

Ground forces generally control wild land fires by building a line around the fire perimeter. The line is dug to mineral soil and may vary from three feet in width when constructed by hand tools to 20 feet in width when constructed by dozers. If the fire is adjacent to a road or in light grass fields, suppression can be accomplished with water from mobile pumpers. Most fires are controlled within a few hours. However, on project fires, large camps are established to feed and equip the fire personnel. Upwards to 1,000 men may move through a processing and rest center in one day. Handling of this many men requires first aid stations, mess and restroom facilities, headquarters complexes, radios, equipment, fuels, sleeping areas, etc.

The 2½ million acres of forest land in western Oregon are under protection contracts with the Oregon State Board of Forestry.

In eastern Oregon 150 summer fire fighters stationed at ten different locations provide the necessary muscle to the BLM protection staff. Early detection by aerial and ground surveillance combined with immediate suppression action by trained crews have kept resource losses in eastern Oregon to acceptable limits.

After a fire is controlled, rehabilitation of the burned area is considered. Small fire areas are generally not treated. Large fires receive varying rehabilitation treatments according to cover, topography, soils, etc.

Existing mining procedures consist primarily of cooperation with mining and mineral interests operating on public lands. Examples of such cooperation include participation in an agreement by the miners, sportsmen, and others, that placer mining will be done only between the period November 15 to April 15, annually, on the Rogue River and its tributaries, and discussions between mining claimants and BLM minerals personnel of the necessity of construction of settling ponds and other methods of minimizing water turbidity.

Much of the cooperative effort is necessarily of a voluntary character due to the nature of the mining statutes. Nevertheless, since the public lands and BLM's management of them are vital to the minerals industry, this voluntary cooperation is almost mandatory if all responsibilities are to be met.

By the Act of May 10, 1872, Congress established a method through which United States citizens could acquire minerals discovered on Federal lands. The expressed intention was "to promote the development of the mining resources of the United States." The law was very broad, authorizing exploration for and purchase of all valuable mineral deposits on lands belonging to the United States. This statute remains the basis for Federal mining law today.

Essentially, the basic provisions of the mining law are relatively simple. They provide certain formalities for locating and preserving a mining claim, but the only substantial requirement is that a discovery of a valuable mineral deposit be made. A prospector needs only to locate his claim properly in order to gain a possessory estate which is good even against the Government. So, with the enactment of the General Mining Laws, all vacant public lands, including the national forests (in 1897), were opened to prospecting and location of mining claims. With few exceptions, this is still the law today, and BLM has very little discretion in the matter.

There are two major limitations of the General Mining Laws, and they are (1) the Mineral Leasing Act of 1920, which provides that oil, coal, phosphate, and a few other minerals could be obtained only by lease; and (2) the Common Varieties Act of 1955, which foreclosed future mining locations for sand, gravel pumice, stone, and petrified wood. A third important amendment to the mining laws, which opened power site withdrawals to mineral location, recognized environmental quality concern and was passed on August 11, 1955. Identified as Public Law 84-359, this amendment provides that "the locator of a placer claim under this Act, however, shall conduct no mining operations for a period of 60 days after the filing of a notice of location pursuant to Section 4 of this Act." If the Secretary of the Interior, within 60 days from the filing of the notice of location, notifies the locator by registered mail of the Secretary's intention to hold a public hearing to determine whether placer mining operations would substantially interfere with other uses of the land included within the placer claim, mining operations on that claim shall be further suspended until the Secretary has held the hearing and has issued an appropriate order. The order issued by the Secretary of the Interior shall provide for one of the following: (1) A complete prohibition of placer mining; (2) a permission to engage in placer mining upon the condition that the locater shall, following placer operations, restore the surface of the claim to the condition in which it was immediately prior to those operations; or (3) a general permission to engage in placer mining.

Existing procedures developed and employed by BLM to minimize erosion and siltation resulting from road construction activities are as follow:

(1) Roads following stream courses are so located that excavated materials will not be sidecast directly in the stream course, and that the road shall be designed so that the toe of the fill sections is above the high-water mark of the stream channel.

(2) An 8 percent grade has been set as the maximum grade to be used without written justification. Sustained grades in excess of 8 percent will be allowed if adequate justification can be furnished to show the need for steeper grades. The State Director shall approve sustained grades in excess of 8 percent, except in western Oregon the District Managers shall approve grades in excess of 8 percent. Justifications shall be furnished the State Director well in advance of formal advertising.

(3) Unstable land forms are avoided whenever practicable. Expert advice is solicited by district personnel from Bureau of Public Roads geologists and/or BLM Service Center soils personnel when problem areas are encountered. Special provisions may be required in the road construction or timber sale contract if it is absolutely necessary to locate a road through proven unstable areas.

(4) Adequate hydrological and hydraulic design of major drainage structures to prevent "washouts" and excessive stream velocities.

(5) Adequate cross drains are designed which permit the unimpeded flow of surface waters and channel flow away from fill sections and other unstable ground conditions.

(6) Sloping of the road subgrade is employed to prevent erosion of the road surface by allowing water to drain laterally instead of longitudinally along the road centerline.

(7) Temporary logging spur roads, upon being abandoned, are waterbarred and/or seeded or planted upon completion of use.

(8) For access road projects a plan-in-hand inspection by BLM and BPR personnel is required procedure after design and prior to construction. Both the State of Oregon Game Commission and the Oregon Fish Commission are furnished copies of the preliminary plans and advised of the time and place of the plan-in-hand inspection. Their attendance depends on the significance of the project as it relates to possible water pollution problems.

(9) Where major drainage structures are involved on access roads, BPR hydraulic specialists also make an inspection of the proposed project to insure adequacy of design and special provisions that might be needed to protect the site.

(10) FP-61, Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, is the basic document used to provide guidelines and specifications for the access road program. While there are a number of references dealing with the protection of adjacent areas to construction projects, the following specific references are made to minimize water pollution:

(a) Section 102-3.2, Utilization of Excavated Material (Roadway and Borrow Excavation).

(b) Section 102-3.6, Protection of Roadbed During Construction.

(c) Section 102-3.7, Stream Obstruction.

(d) Section 103-3.3, Utilization of Excavated Material (Excavation and Backfill for Structures).

(e) Section 103-3.5, Preservation of Channel.

Special provisions may also be written to cover any work requirement, or a proposed contract, if the aforementioned standard provisions do specify the work involved and/or do not provide adequate control of this work.

(11) Once construction begins on the access road project, close liaison is maintained between the BPR resident engineer and BLM district personnel, and the Game Commission field personnel, if construction is near a major stream or if a major drainage structure is involved.

(12) On timber sale constructed roads BLM contract inspectors are responsible for insuring that the purchaser takes the necessary precautions to keep stream pollution to a minimum. The main timber sale contract stipulation with respect to pollution is found not in the road specifications but in the general contract stipulations. This is Section 23. Watershed Protection; Stream Pollution and Erosion Control, of the timber sale contract.

BLM road maintenance procedures in western Oregon are as follows:

(1) Supervision and inspection of timber sale road maintenance is handled in much the same manner as timber sale road construction. Section 23 of the Standard Provisions of the Timber Sale Contract, referred to in A2c(1) of the Road Construction section, is used to minimize pollution where maintenance activities are concerned.

(2) Maintenance by permittees of BLM roads is reviewed by district personnel.

(3) Where maintenance is being performed by BPR crews, close liaison is maintained with the crews by the BLM maintenance engineer. These crews have been issued instructions regarding disposal of slide material to insure it will not be placed where it can enter streams and cause pollution.

(4) In the event that a slide encroaches on a stream course and has to be removed at an inopportune time, i.e., during wet weather, the Game or Fish Commission people are generally contacted and an onsite meeting arranged to determine the best course of action.

(5) In the brush control phase of road maintenance, strict attention is given to the placement of chemical sprays. Each district's program is prepared and submitted for approval. In application, strict attention is given to the placement of the spray to insure it does not reach to streams. No oil carriers are used.

(6) The importance of mulching and seeding in controlling erosion and minimizing siltation is recognized by BLM and an effort is being made to utilize the protection afforded by this type of cover. At the present time the most critical areas are being treated and it is planned to enlarge the program, commensurate with needs and funding levels, to include additional exposed areas.

National Park Service

The Oregon pilot review does not provide a complete or representative cross section of National Park Service management policies and land conservation measures. Only two of the types of areas in the National Park System are represented. These two are natural and historical areas. No national recreation areas (the third type of area the Service administers) have been established in Oregon. This type of area is managed under quite different resource management objectives than are the first two types of areas. For example, national recreation areas are multiple-use in character as regards allowable types of recreation.

Further, the natural areas of the System in Oregon are not subject to public use pressures and other problems to the same degree as are many areas in other States, nor does the authorizing legislation permit certain resource uses that the specific Congressional acts authorize in some other areas. Examples are mining (except for valid existing claims) and water resource projects. Mineral prospecting and the extraction of minerals, including the removal of soil, sand, gravel, or rock, may be authorized in national recreation areas. Selective timber harvesting, agricultural uses, and other resource manipulation also may be conducted in these areas. For these reasons, some of the material below pertains to areas other than those in Oregon, with the thought of providing as wide a cross section as possible of Service land management practices and allowable uses that either maintain or affect water quality.

General

Each area of the National Park System is under the direct supervision of a Superintendent, who is responsible for implementing the statutes and policies pertaining to the area. He also is the contracting officer for the Service on all phases of park development with the exception of park road construction contracts which are handled by the Bureau of Public Roads. Even here, the Superintendent supervises the construction and exercises control over such things as temporary sanitation facilities, resource protection during construction, slash and any timber disposal, soil erosion, etc.

All plans involving health and sanitation are reviewed by the Public Health Service and the State sanitary authorities. FWPCA coordinates and assists in the latter phase of plan review and approval. They are also subject to review and approval by the Superintendent.

Concessions

Many of the visitor overnight accommodations, as well as certain other services in the areas of the National Park System, are provided by private enterprise through concession operations and are controlled by the Service through concession contract. In general, the concession buildings and other structures are constructed by the concessioner from plans he has prepared and which have been approved by the Service.

Access roads, parking areas, and utilities including power, potable water, and sewage disposal that serve the concession area are planned, constructed, and maintained by the Service. Plan review and approval are the same as noted above.

Sanitation

In areas of exclusive legislative jurisdiction and where private inholdings exist, such as at Olympic and Glacier National Parks, regulations on water supply and sewage disposal on such private lands are promulgated by the Superintendent. All private water supply and sewage disposal systems in these areas must comply with State and county laws and regulations applicable within the county where such systems are located.

Crater Lake National Park disposes of solid waste material, other than solid sewage, by means of sanitary landfill in the park. General policy, however, provides that such disposal in areas of the National Park System be handled through contract whereby the material is removed from the area to a sanitary landfill outside the park boundary. This is the case with the other areas of the National Park System in Oregon.

Crater Lake also has a special use permit for the provision of special food services to seasonal employees served in a government facility. This operation, plus the concession operation described above, are inspected annually by the Public Health Service.

The Park Superintendents maintain close liaison with the FWPCA Water Laboratory at Corvallis. During the summer of 1968, for example, a team from the Laboratory spent 10 days at Crater Lake. Consumptive water uses, effluent discharge, and disposal methods were reviewed in detail with the park staff. A lagoon system has been installed, and all sewage from Munson Valley and the Rim area is to be ultimately discharged into this system. Sewage treatment and disposal is by means of septic tanks and leaching fields at Oregon Caves and Fort Clatsop.

Timber Sales

The Service may conduct such sales in connection with park development, particularly road construction, when the commercial value of the timber involved exceeds the administrative costs of the sale.

General specifications developed by the U. S. Forest Service form the basis for NPS timber sales contracts, as the Forest Service is the leading agency in selling timber. Special contract provisions are included for the preservation of the values for which the area concerned was established. Other provisions relate to the protection of water resources from pollution resulting from logging operations, and restoration of the natural landscape including slash disposal at the termination of the operation.

Toxic Chemicals

The use of herbicides and pesticides in areas of the National Park System follows the guidelines established by the Federal Committee on

Pest Control. Each proposal for the use of a toxic chemical originates at the park level and is reviewed by a special committee to evaluate the proposal for compliance with Service objectives, program standards, desirability, and need. It is also reviewed for compliance with the standards established by the FCPC. Economy is not a sufficient justification for use. Other methods of disease or pest control are used when management objectives can thereby be achieved.

Fort Clatsop is the only area in Oregon where toxic chemicals are used, but the rate of application is minimal.

Boating and Related Activities

Pollution of waters within areas of the National Park System through such recreation activities as boating and fishing are controlled through Service regulations. Provisions are made for regular boat inspection. Recent developments include boat waste dump stations and fish cleaning facilities to prevent pollution problems arising from such public use.

Concession operated boats on Crater Lake may be causing a degree of pollution through gasoline and oil spillage or seepage. A research project to determine the specific degree of any residual pollution will be conducted this summer. If the results are positive, other types of boat transport, such as electric, will be substituted.

Crater Lake is a remarkably pure body of water, with a chemical impurity of only 80 parts per million. The Service's objective is to maintain the present purity.

Bonneville Power Administration

All construction work is contracted out to contractors on an award-to-the-low-bidder basis. In forested areas construction is scheduled in two stages. The first is cutting of the timber, building of road and clearing of the right-of-way; the second, a year later, erection of the power line. The first contract is usually awarded to an "earth" construction company, logger, or to one of several companies that specialize in line clearing.

Several standards are applied to the treatment of transmission lines as preventative measures against property damage, water pollution, turbidity, erosion, and slides. These include sanitation rules, access road rules, and clearing and construction rules.

The use of standard rules facilitates their application to an area; instead of a verbose discussion, instructions are explicit and short. The following is an example lifted from the contract:

Mile 37 City of Ellensburg watershed;
(a) Station 1955+44.3 to 2073+82.5
Rules; A-2, C, D, E, F-2, F-3, R-1, R-2 and T.

(b) Station 2067+04 to 2073+82.5
Rules; S-1, S-2, U-1, U-3, V and Y, in addition to those listed under (a) above.

To spell out the above protective coverage in words would consume a lot of time and space. On this 128 mile line there are 55 restricted zones in which rules are applied.

It is BPA's policy to conduct its transmission line construction and maintenance program in a manner that will minimize water pollution and soil erosion problems. Advice is solicited from the Bureau of Land Management and the Forest Service on protective measures needed to be taken by clearing and construction contractors building transmission lines and access roads on lands controlled by these agencies. A Memorandum of Understanding has been worked out between BPA and these agencies to formalize protective measures. The BPA geologist has the duty to specify protective measures for domestic water supplies and for sanitation and soil erosion in BPA's clearing and construction specifications at locations where BPA's transmission line right-of-way crosses streams.

It is the Administration's policy to provide money in the construction work orders so that seeding around towers and along access roads can be done and otherwise conditioning roads against erosion such as placing gravel and cross-ditching after the transmission lines are completed. This work is done by BPA crews or by Forest Service or BLM personnel.

In the maintenance of the brush on the right-of-way, maintenance standards specify that care shall be exercised to avoid contamination of stream and other bodies when using herbicides. They also take care to avoid drift and other adverse effects. Maintenance also performs seeding of areas denuded of vegetation to prevent soil erosion. They also encourage the growth of cover crops and vegetation through selective spraying for the same purpose.

Recently, Maintenance has also acquired track-laying type vehicles for patrolling and performing other right-of-way maintenance to avoid rutting of roads and subsequent soil erosion.

Bureau of Indian Affairs

The Indian lands in Oregon are under the direction of an Area Director who exercises the authority of the Commissioner in the direction and supervision of Bureau activities in the area. Program activities and tribal business operations, which by their nature must be performed at the local level, are conducted at the agencies. The agencies are under the direction and supervision of a Superintendent who is responsible for the development and execution of immediate and long-range programs to fit the needs of the people and the reservations under his jurisdiction.

Assisting him are specialists in the fields of economic development (agricultural engineers, soil conservationists, foresters, real estate managers, soil scientists, etc.), community services, education, administration and engineering, as needed. Boarding schools (Chemawa) located off reservations are used for the education of Indian children who otherwise would not be able to attend school. The Chemawa School is under the direction of a school superintendent who reports directly to the Area Director.

The primary function of the Agency Natural Resource Specialists is to assist the Indian people to assume their responsibility in the conservation, use, management, and educational processes as they pertain to farm, home, and community development. Indian people are included in all phases of preparing and initiating a program of farm, home, and community improvement and proper land use as a means of providing training in wise administration and use of their land, and to assume proper consideration of Indian interests in watershed protection projects and in balanced multipurpose river basin programs. The Indian people are assisted in developing cordial working relationships with all agencies who can help them in their overall program now and in the future in an everlasting degree as they progressively assume a full role of responsibility in society. An inventory of all physical land, water, and forage resources and their condition is essential to guide the utilization and treatment of these resources providing permanently for sustained yield production on cultivated and range lands; to reduce flood crests and to safeguard land from overflow and sedimentation; to reduce impairment of reservoirs by sedimentation; to develop available irrigation water and to maintain underground water supplies; to develop and maintain all cultural, recreational, fish, wildlife, and other land use practices in accordance with the potential capability of each parcel of land.

The Bureau over the years has, through its specialists and administrative personnel, provided the leadership and political climate in its efforts to stabilize the sediment source by proper land management and erosion control measures in dealing with the water pollution problem. The Bureau insists on coordination of all its activities to minimize the danger of water pollution. During construction of roads, land conserving measures, or other activities that disturb the soil, sediment production is intensified. Existing legislation for effective erosion control on Indian lands is generally adequate. The lack of adequate programs in erosion control on these lands stems from the need for increased funding to conduct needed programs.

Bureau of Reclamation

For much of the land withdrawn by USBR, the BLM provides the management for land use as related to fire protection and grazing. Lands used for water delivery are protected from excessive erosion by seeding with appropriate grass mixtures. These plantings are continuously protected from noxious weeds by using herbicides approved by USDA, and the applications are made according to approved methods. Care is taken to hold water pollution to a minimum.

Waste disposal at BR facilities meets FWPCA requirements. When recreational facilities are constructed, adequate waste collection and treatment are included even though some other Federal or non-Federal agency may be responsible for operation.

As a multiple purpose water resource development agency, BR is obligated to protect water quality to suit each individual use involved. Protection of water quality is regarded as one of BR's functions, and the quality of water in the forms of runoff from public lands, storage, delivery, and return flows is protected.

Below is a brief description of procedures followed by the Bureau of Reclamation, irrigation districts, and canal companies in the conservation of rights-of-way on carriage, distribution, and drainage systems.

Seeding and Planting. It is a long standing policy of the Bureau of Reclamation to seed all distrubed rights-of-way on canals, laterals, and drains as soon as practical following construction. This involves the shaping and leveling of all disturbed areas and the seeding of grasses which will prevent infestations of noxious weeds and other troublesome plants. Where possible, press wheel drills are used to place the seed. In the rougher areas the land is harrowed and the seed broadcast onto the roughened area. The seed is then covered by dragging with harrows (with teeth sloped), or dragging with chains.

Brush and Weed Control. A comprehensive weed control program is conducted throughout the Region. In this program herbicides are sprayed over the rights-of-way for the control of brush and weeds. Most districts and canal companies accomplish this with spray rigs equipped with booms.

Pest and Disease Control. Of necessity all irrigation districts and canal companies conduct programs in the control of pocket gophers, muskrats, badgers, and ground squirrels. This is accomplished through the use of poison bait, traps, and gases. Many of the canal breaks can be traced to damage caused by these pests as they establish their burrows and nests in the banks.

Fencing. In many of the areas adjacent to pastures and public grazing areas, it is necessary to fence while new seedings are being established. Usually three barbed wires are used with posts located approximately 1-1/2 rods apart.

Cattle Guards. It is the standard practice on all carriage, distribution and drainage systems to construct cattle guards over which operation and maintenance equipment can travel but which will stop the movement of livestock. Such guards are usually prefabricated with heavy gage steel.

Removal of Debris from Canals, Laterals, and Drains. Trash racks are established at strategic points throughout the carriage, distribution and drainage systems which collect and remove debris. Some of these structures are operated with the rack attached to an endless chain which carries the debris out of the system, depositing it on metal grates where it is burned. Stationary trash racks are constructed with 2-inch galvanized pipe which is placed in the channel 4 inches apart on a 4-to-1 slope. Ditch riders can rake the debris from the racks onto metal mats for burning.

Bank Leveling. It is standard practice throughout the Region to level all spoil piles and rough areas following construction. This is usually accomplished with bulldozers and harrows while preparing the land for seeding.

Riprap. Rock riprap is used extensively in canals, laterals, drains, and reservoir areas for the prevention of erosion. As a general rule the area to be protected is prepared on a 1½-to-1 slope or flatter, on which rock is placed.

Bureau of Sport Fisheries and Wildlife

Bureau land management centers on agriculture made up of grazing, haying, and crop cultivating elements. These elements are programmed under land use plans written by the field project leader and approved by staff in the Regional Office. The land use plans incorporate practices to achieve the highest degree of land stewardship to prevent erosion and actually upgrade soils to better condition and fertility. Plans are checked to see that these high standards are incorporated and field inspections are made to see that prescribed standards are maintained.

The application of fertilizer is accomplished at rates recommended by soils analysis.

The application of herbicides and pesticides is held up pending approval of the type, amount, and agent to be controlled. The approval process involves a review by the Regional Biologist in the Division of Refuges, and then screening by the Regional Director's reviewing agent, before being submitted to the Central Office for approval action by an Interagency Pesticides Review Board.

Up to this point in time, the Bureau has made no checks against controlled burning except to eliminate all potential fire spreading and to make certain that proper objectives (usually vegetation control) are achieved.

Other land management practices appear to be disassociated from pollution causative agents.

CHAPTER V

APPRAISAL OF WATER POLLUTION PROBLEMS

The pilot review disclosed 12 land management practices and 22 conservation measures having an impact on water quality. These Federal activities are being carried out on 17 million acres, which is over one-half of the Federally owned land in Oregon, or about 25% of the State's total land area.

Quantitatively, little is now known about the extent of pollutants generated by such activities. Therefore, the degree to which these land uses, practices, and measures actually lower the quality of lakes, streams, and rivers in Oregon is not known, nor could this be determined by the Task Group in so short a time. But the nature and seriousness of the water pollution problems caused by them is not masked by the lack of quantitative data.

Several types of waste materials originate from these operations--namely--sediment, nutrients, bacterial contamination, chemical, organic and inorganic wastes, debris, oxygen deficiency, and temperature.

The impact on water quality from these land managing activities stems from one or a combination of the following: (1) the very nature of the management practice, (2) improper management procedures being used in conducting the activities, or (3) lack of carrying out certain conservation measures to the extent necessary for adequately controlling water pollution.

Existing Water Pollution Problems

Each land managing agency reported that its land practices had or were having some adverse effect on water quality. An appraisal of existing water pollution problems is outlined below under the associated land managing practice. The potential threat that these Federal activities holds for water quality is also explored. It should be pointed out that the abatement of water pollution is limited in many instances by conditions beyond man's control, such as storms of unusual severity, geological erosion, or severe abuse of watershed lands prior to development of effective conservation programs.

1. Timber Management

Soil movement into waterways, logging debris left in streams, and increased water temperatures may result from the harvest of timber. Steep topography, along with heavy old-growth timber and the use of large equipment, may cause considerable soil movement and, hence, silting and sedimentation of water. Large amounts of debris in some waterways may prohibit fish spawning and passage. The cutting of timber and removal of vegetation along some streams may influence water temperatures.

2. Range Management

The plow, the axe, and the hoof have been called the three greatest causes of soil erosion and accelerated runoff. Of these, the hoof--the impact of grazing animals on the land--perhaps affects the greatest portion of the study area's land resources.

Past grazing practices have resulted in deterioration of the soil and vegetation resources in some areas. In these areas, improper grazing has upset the hydrologic balance between soil, water, and plants. This has resulted in some unfavorable stream flow conditions, which has led to increased turbidity and sediment content, and undesirable physical and chemical qualities.

Livestock are contributing to the pollution of streams and lakes through physical movement and direct waste discharges. In some areas, improper livestock management coupled with lack of fencing and watering facilities has degraded water quality.

3. Watershed Management

Restraints imposed by various water users are preventing treatment of some watersheds and causing excessive sedimentation. A significant pollution problem arises from conflicts among water users, or even other agencies' plans for use of water from watersheds.

4. Stream Protection

The conduction of stream clearance and barrier removal, gravel placement and gabion installation may inadvertently cause minor siltation. It is minimal, however, when compared (for example) to the cutting and erosion that results from plugged culverts or bridge washouts caused by debris jams. When care is exercised, it is felt that very little damage to water quality results from prescribed stream improvement practices.

Streamside plantings for shade and bank control, the seeding of roadside cuts and fills, and various plantings for wildlife food effectively reduce siltation and promote reduced water temperatures. These practices can be conducted with little or no stream contamination.

5. Wildlife Management

Fish hatcheries--either operated or funded by the Federal Government--are discharging pollutants into streams. Fecal matter and other metabolic products contribute organic matter and cause turbidity. Nitrogen compounds and phosphates are the major contributors. Pollution caused by fish hatchery effluents is generally limited to stream areas immediately below discharge points. Dilution and natural processes rapidly eliminate the effects of this pollution.

6. Outdoor Recreation Development

The State of Oregon has estimated in excess of 100 million visits annually to Oregon lands for outdoor recreation. It is estimated that approximately 20 million of these visits will be to Federally managed lands. Many areas will receive heavy usage without sanitary facilities.

The recreation pollution problem can perhaps be considered in two major categories: (1) the impact of 20 million visitors being there, and (2) the impact of the practices of these people or what they do while there.

Pollution from visitors on public lands can be categorized as body wastes and litter, in the broadest sense. Body wastes are deposited at random around areas of heavy use, often directly into streams or other bodies of water. Litter, as used herein, includes solid garbage and various polluting liquids, such as used wash water, oils, etc. Such materials can be readily observed directly in streams adjacent to heavily used areas.

Recreation practices are causing: (1) Erosion--motorcycles, boats, uncontrolled wear on stream banks, off-highway vehicular traffic, etc.; (2) deposit of polluting materials--motor boat oil, fishing line, containers of various kinds, etc.; and (3) vegetative damage--wear on streamside vegetation, fire damage, including cutting vegetation for campfires, defacing vegetation in various ways, ranging from mere wear through deliberate vandalism.

7. Road Construction and Maintenance

In the mountainous terrain which characterizes most land ownership in Oregon, road construction activities will cause, to one degree or another, erosion of the land form and stream siltation. The main concern, therefore, is to minimize as much as possible the resulting erosion and siltation from this activity.

To establish practices and procedures for controlling erosion and siltation during and after road construction is not sufficient in itself; enforcement of such directives is of equal importance.

8. Fire Protection

Fire control efforts are designed to prevent the burning off of vegetated watersheds. Pollution arising from the control efforts is minimal when compared with the sedimentation and soil movement on the burned-over watershed.

Water pollution has occurred from the control of wild land fires, as a result of (1) dropping of fire retardant into live streams, (2) soil erosion on fire trails constructed on steep slopes, and (3) garbage and litter arising from the massing and equipping of fire personnel on project fires.

All three of the above problems can be controlled under proper supervision. To date, pollution from fire control efforts has not been a problem.

Perhaps of greater concern is the pollution arising from the burned-over area. A burned-over area is subject to increased surface runoff, soil slippage and stream bank erosion. The steeper the topography, the more critical becomes the pollution problem.

Recovery of valuable timber lost in a wildfire accentuates the pollution problem. The salvaging of an estimated 800 MM board feet of timber from the 1966 Oxbow area has caused severe erosion. Rapid timber salvage efforts are required in a forest fire area and the haste attendant with the salvage program often contributes to the soil sedimentation problem.

9. Minerals Management

The mineral industry is well aware of the need to improve its mining methods in order to reduce water pollution. These actions are being taken throughout Oregon and the entire country. Most references to the despoilment of the land and water by the mineral industry generally are made to operations which have taken place in the past. Nowadays, it is commonplace to reclaim the land after mining, to establish settling ponds during operations, and to conduct placer mining only during certain months of the year.

10. Power Line Construction

The Bonneville Power Administration record has been very good in the State of Oregon in controlling erosion and regulating contractors' activities. But some trouble has been experienced in the State of Montana with a contractor muddying up a stream with his clearing operations. This experience has led BPA to revise its clearing specifications to restrict any machine clearing operations within 100 feet of a stream.

BPA clearing specifications restrict machine clearing on the steep banks of streams and specify method of logging along stream banks to avoid stream bank disturbance or leaving logging debris in streams.

Generally, a transmission line right-of-way does not constitute a water pollution problem except during the clearing and construction period and for a year or so thereafter. Care in locating the line and the access roads and enforcement of the specifications helps to minimize stream pollution and soil erosion.

11. Canal and Reservoir Management

The use of chemicals for weed and pest control poses an ever-increasing problem. There is need to establish a permanent monitoring system for pesticides. There is also a need for research to establish residue tolerances for various water uses and to develop effective chemicals that will not leave harmful residues.

12. Other

(a) Water pollution problems caused by these kinds of Federal activities have also been recognized on a case-by-case basis as a result of complaints from the public.

(b) Private timber agencies sometimes cause considerable stream pollution on lands adjacent to those of the Bureau of Land Management. This is due to the checkerboard pattern of BLM lands, especially in western Oregon. It is difficult to maintain proper water quality on public lands when careless logging and road construction are polluting streams above and below lands under BLM jurisdiction. In many of these cases, BLM has been blamed for causing the pollution.

(c) The Task Group is concerned and apprehensive about the rapidly growing use of pesticides of diverse chemical nature, of diverse biological activity, and from multiple sources.....on Federal lands. It is already clear that pesticides are dangerous. They have often caused unintended and damaging side effects, including heavy losses of fish and wildlife in some areas. They adversely affect natural systems and they may even pose a threat to man himself.

Potential for Pollution

Perhaps the most significant thing about these identified activities is the continuing threat they hold to water quality. This potential for pollution is summarized in the table and outlined in greater detail below.

TABLE J2
WATER POLLUTION CAUSED BY LAND MANAGEMENT PRACTICES

LAND MANAGEMENT PRACTICES	WATER POLLUTION									
	Bacterial Contamination	Chemical, Organic & Inorganic	Nutrients	Sediment	Turbidity, Odor & Color	Debris	Salinity	Oxygen Deficiency	Temperature	Radioactivity
Timber Management				--	--	--			--	
Range Management				--						
Stream Protection										
Watershed Management	--	--		--						
Fire Protection		--		--	--					
Minerals Management		--		--	--					
Road Construction & Maintenance				--	--	--				
Outdoor Recreation Development	--			--						
Wildlife Management	--									
Power Line Construction				--					--	
Canal & Reservoir Management		--						--	--	
Cropland Management		--	--	--						

1. Timber Management

(a) The greater part of erosion resulting from the logging of forested areas comes from the required roads and their construction. Improperly constructed logging and mining roads on public and private forests constitute an increasing source of serious sedimentation. Volumes as much as 2000 cubic yards per square mile of access road have been measured in mountainous country.

Runoff from a small western Oregon watershed, during the first rain storms after road construction, carried 250 times that found in an adjacent, undisturbed watershed.

The lands most subject to erosion are forest lands on steeper slopes which are exposed to high rainfall and snowmelt. Proper logging practices, careful planning for road construction, and maintenance of vegetative cover can greatly reduce sediment production from forest lands. Slash burning, wildfire, and fire fighting lanes and trails result in increased sediment production. Therefore, it is imperative that the proper management practices be followed in making changes in the forest environment.

(b) Timber management activities deposit logging debris from felled live trees directly into flowing streams and into the channels of intermittent streams. Leaves, twigs, bark, limbs, and cull wood may be included in this debris.

Decaying and decomposing, standing and down vegetation, including snags and old logs, may fall into or be dragged into streams and channels during timber management activities.

(c) Removal of stream shade by clear-cut logging, slash burning, or chemical brush removal exposes water surfaces to increased insolation and results in increased water temperatures. For instance, measurements on relatively short reaches of small streams in the Alsea Experimental Watershed study, in the H. J. Andrews Experimental Forest, and in the North Umpqua River system, show temperature increases greater than 10 degrees Fahrenheit. These increases may be extremely critical for the fish and other aquatic life of these streams even though the overall effect on the large, main-stem streams may be nondetectable.

2. Range Management

(a) Injudicious livestock grazing may greatly accelerate soil erosion through soil trampling, stream bank caving, and overgrazing of the vegetation.

More miles of livestock fencing should be constructed for protection of conservation works, rehabilitation of eroded or deteriorated lands, control of livestock use in areas of primary value for fish and wildlife, and grazing system management. Additional livestock and game water facilities such as springs, wells, troughs, ponds, and guzzlers, are needed for broader and more uniform distribution of livestock, conservation of existing water supplies, and preservation of the quality of water. Some 20 percent of the benefit of fencing and water facility development are for erosion and water quality control, 10 percent for water conservation, and 5 percent for debris and reduced flows.

3. Watershed Management

(a) Land uses in some watersheds will involve such sediment producing activities as road building, tree felling, log yarding, water impoundment construction, canal construction, transmission line construction, fire line, fire trail, or fire lane construction, and construction of a number of different kinds of buildings.

(b) Considering watershed management to be the manipulation of all the natural resources within the drainage boundaries of large and small streams, for the maximum sustained yield of all possible products that can be "harvested" from the land, good watershed management requires a compromise between a number of conflicting uses.

Maximum sustained yield of some products, particularly outdoor recreation, can present some problems from bacterial contamination. Permitted grazing by domestic livestock and the presence of wild animals also increase the number of bacteria found in stream waters.

(c) Aerial spraying of pesticides to accomplish watershed management objectives will place some chemicals in stream waters.

(d) Fertilizer application will increase. Widespread application to large areas will be accomplished aerially. Such activities will deposit some plant growth nutrients directly in streams.

4. Fire Protection

(a) Sediment may be washed into streams from fire lanes and fire trails. Steep, emergency, tractor-made fire roads and trails are especially vulnerable to accelerated erosion. Unless thoroughly drained or protected with water retention bars or dams, they may be expected to produce enormous quantities of sediment. Fortunately, such situations are relatively rare and, although of tragic consequence locally, their state or national significance is negligible.

(b) Present day forest fire fighting techniques include aerial spraying of fire suppressants. A small fraction of such sprays may be expected to fall into or be washed into streams.

(c) Minor problems of turbidity, color, and odor will occur when tractors cross streams while actually fighting fires or when preparing fire breaks.

5. Minerals Management

(a) Sediment production has been one of the most serious pollutants generated by certain types of minerals activities. In the past, complete rearrangement of the channels of many streams has occurred during placer mining activities. This has not only ruined the sections of streams that have been actually worked, but it has silted many stream sections and has blocked the passage of fish into or out of the sections upstream. This type of activity is rapidly being corrected. First of all, the mining companies themselves are aware of the need to improve their mining methods and are actively taking steps to make their improvements. Secondly, most placer mining areas have already been worked out.

(b) Drainage from deep or surface, high-sulfur-bearing coal mines may be extremely important locally because of its acidity (low pH). There are no existing mines in Oregon but rather extensive deposits exist in Washington and Alaska. The Washington coals are relatively low in sulfur but those in Alaska could be a problem.

Other types of minerals originating from mining, or processing, or industrial waste effluents may be serious pollutants in the Pacific Northwest. As an example, the South Fork of the Coeur d'Alene River has carried large quantities of mining wastes, though mining companies have taken active steps to clear this up.

(c) Increased turbidity and color follow all instances of accelerated erosion and sediment production. Some of this has occurred during mining and ore processing operations, though in most instances steps are being taken to clear up this turbidity.

(d) Since Oregon is a coastal state, oil drilling operations on the Continental Shelf carry a "blowout" potential similar to the Santa Barbara oil well of last January. Stringent new regulations governing oil and gas leasing on the entire U. S. Outer Continental Shelf from Maine to Alaska were approved last August. These new and comprehensive rules may be the tools needed to protect the environment in this crucial area near Oregon's coastline.

6. Road Construction and Maintenance

(a) Road construction disturbs huge quantities of soil and contributes much sediment to streams.

Erosion along rural roads is extremely serious where protection has not been provided. It has been shown that during road construction in some areas sediment amounting to some 89,000 tons per square mile per year has been produced at the source. The sediment yield for an average storm from highway construction areas has been found to be about 10 times greater than that from cultivated land, 200 times greater than that from grassed areas, and 2000 times greater than that from forested areas.

Amounts equivalent to 27,000 to 185,000 tons of soil have been lost per square mile per year depending on rainfall, degree of slope, and exposure of the bank. Most erosion resulting from the logging of forested areas comes from the required roads and their construction. Improperly constructed logging and mining roads on public and private forest land constitute an increasing source of serious sedimentation. Volumes as much as 2000 cubic yards per square mile of access road have been measured in mountainous country.

Construction of roads, railroads, dams, power transmission lines, and pipelines may disturb the soil over as much as eight percent of a given drainage area and add huge quantities of displaced soil and erosion debris to the streams. Silt is frequently washed into streams from overcasts of excess rock and soil, from cut and fill slopes, from borrow pits, and from aggregate washing and handling facilities. Improper use and maintenance of roads may increase silt and turbidity problems; the wheels of vehicles traveling rutted, poorly surfaced roads splash mud into watercourses and careless maintenance work may undercut side slopes and increase soil movement in roadside ditches that drain to streams. Though the effect of passage of a single vehicle is small, the aggregate effect of many vehicles over a period of time is quite significant.

(b) Since turbidity and color vary directly with the concentration of sediment, they may greatly increase during road construction and maintenance.

Water odors would be caused by growths of algae or by organic matter decay. Both of these may be increased as a result of road construction.

(c) Right-of-way clearing will create varying quantities of organic debris. More or less of this will fall into streams and drainage ways.

Most rights-of-way must be vigorously maintained in order to control the sprouting of shrubby and woody vegetation. Most of this material can be kept out of the streams rather easily.

7. Outdoor Recreation Development

(a) Outdoor recreation development will increase the bacterial contamination of streams if it attracts additional visitors to the area being developed. It may conceivably decrease the contamination by providing good sanitation facilities where needed.

Increased water contact activities will result in increased bacterial contamination. Provisions will be required to eliminate or control such contamination.

Swimming and bathing in streams on public water supply watersheds yielding high quality water requiring no treatment except disinfection should be prohibited. On other streams, sites for recreational swimming should be located where adequate sanitary facilities for the use of the public and the protection of the stream can be installed.

Another problem involved in all boating is the lack of sanitary facilities in locations frequented by boaters. The heavy use of the small islands in the lower Columbia River is a case in point. Where boating use patterns are known or can be anticipated, installation of sanitary facilities to meet the need should be made by the responsible authority. Posting and frequent policing are also desirable. The problem of portable disposable toilets used by many boaters must also be given attention; too often disposal consists of setting them adrift.

(b) All construction projects cause soil disturbances. Control of accelerated soil erosion during and after construction pays off in reduced construction and maintenance costs, as well as reduced water pollution by sediment. Such control should be sufficient to assure that turbidity in the river water will not be increased to more than 10 ppm, or other locally established limitation, in streams used for public water supply. In streams used for other purposes the increase in turbidity should be kept below 50 ppm.

Construction of the following outdoor recreation developments may cause sediment pollution problems: (1) permanent camps with permenent buildings, access ways, and facilities whether provided by governmental agencies or private industry, (2) road construction, (3) buildings, (4) parking areas, (5) picnic grounds, (6) overnight camps, and (7) temporary tent camps.

8. Wildlife Management

(a) Both livestock and big game animals feeding in and near watercourses add to pollution hazards. Big game must be harvested. If populations and concentrations grow too large and intense, overgrazing and accelerated erosion will result. Even the carcasses of starved animals dying in streams may be found. Beaver ponds and bear-wallows may be sources of high coliform bacteria counts in water supplies. Dead animals and offal from cleaning game in or near watercourses are other sources. In years of epidemic insect infestations, particularly by tent caterpillars which live on hardwood trees and shrubs along watercourses, vast numbers of both larvae and adult insects may fall into the streams and, in decomposing, present a locally serious pollution problem.

Beetles, birds, rats, and other species of wild animals carry bacteria into streams, ponds, bays, and lakes.

Too heavy grazing use, which removes the plant cover and compacts the soil, leads to accelerated erosion.

On many watershed range lands, past grazing use has been excessive; denuded ranges contribute disproportionately large amounts of runoff to flash floods and erosion sediments to channels downstream. Grazing use is less intensive and is better managed now, but the effects of past misuse are still evident. Natural rehabilitation of soil and cover is a very slow process and may not alone be able to stop the cycle of degradation. Pasturing stock in meadows may increase stream turbidity and sediment loads where stock cross streams or trampling by stock breaks downstream banks and constantly roils the water. The soil of areas for stock feeding and watering may become greatly disturbed by concentrations of animals and also contribute significantly to stream turbidity and sediment.

9. Power Line Construction

(a) Hydroelectric installations can, if not properly planned and installed, cause much soil to foul the streams and impair water for fishlife and other downstream uses. Vegetation removal lays the soil bare to the destructive action of wind and water.

Construction of roads, railroads, dams, power transmission lines, and pipelines may disturb the soil over as much as eight percent of a given drainage area and add huge quantities of displaced soil and erosion debris to the streams. Silt is frequently washed into streams from overcasts of excess rock and soil, cut and fill stopes, borrow pits, and aggregate washing and handling facilities. Excavations for bridge abutments and foundations for dam and tower structures are another source.

10. Canal and Reservoir Management

(a) Natural geologic erosion occurs during normal high runoff periods. The resulting stream turbidity is usually uncontrollable, stream ecology is adjusted accordingly, and such turbidity is not properly classed as pollution unless accelerated by man's activities. Land slides caused by earthquakes or from unstable soil and rock formations heavily lubricated by groundwater in abnormally wet seasons, or undermined by stream bankcutting, may discharge huge quantities of soil, rock, and organic debris into streams all at once. Snow avalanches in the higher mountains every winter bring down large amounts of plant material, soil, and rock to stream channels; however, since avalanches tend to repeat at irregular intervals in the same channels which are already scoured fairly clean, most of the debris is plant material. Frequency and size of landslides and avalanches may be drastically increased by activities on the land. Uncontrolled fire has increased the avalanche hazard in many mountain areas.

Any of this organic matter that is diverted into canals, ponds, lakes, or reservoirs, any other organic matter that grows or is deposited in such receiving waters, or organic solutes from livestock feedlots, corrals, manure storage, or barns may create an oxygen deficiency, especially where the water is deep.

Temperature affects stream ecology and fish habitat, oxygen-carrying capacity of the water, and industrial use of the water.

(b) Return flows from irrigation may occasionally be several degrees warmer than the source from which the water is drawn. This may adversely affect the water as fish habitat, or for industrial use. Clearing land, where it involves removal of brush and trees that shade water sources, also contributes to increasing water temperature.

Where streamflow is replenished from reservoir surface waters, the outflow may be several degrees warmer than the inflow. Conversely, where the outflow is released from the bottom, it may be cooler, though its oxygen content may also be changed.

Temperature is one quality of return irrigation water concerning which evidence is incomplete. There are instances where irrigation return flows cause an increase in the temperature of the receiving water. High water temperatures emphasize tastes and odors, increase the quantity of water needed for cooling, cause more rapid growth of aquatic weeds, increase the rate of decomposition of organic substances, interfere with the propagation and development of some types of aquatic life, and activate columnaris disease in certain types of fish.

Other irrigation water quality considerations may affect plant growth. Temperature of the water, if excessively high or low, and its resultant effect on the soil temperature in the root zone, could depress plant growth. Soil aeration and oxygen availability may be a factor deterring plant growth if water having high BOD values is used, although no specific information is available.

(c) Numerous chemicals used in fertilizer and pest control sprays and dusts, or leached from saline soil, or dissolved in drainage from farmsteads and feedlots may adversely affect water quality. Return flows from irrigation can be a source, if they carry salts leached from the soil or fertilizers, or pest poisons applied too liberally or carelessly. Irrigation is often used specifically (under controlled conditions) to remove excess salts from the soil. Organic solutes from livestock feedlots, corrals, manure storage, and barns may be carried (to canals or drains and thence to ponds, lakes, reservoirs, or streams) mostly by overland flow and perhaps occasionally by groundwater drainage. These chemicals may be toxic, but in other instances may add nutrients that cause undesirable slime growths in the receiving waters or create an oxygen deficiency. Household chemicals may be added to groundwater by drainage from farmstead or other sewage disposal systems. Gasoline, oil, cleansers, paint, or other chemical spills used may also add to the pollution load.

11. Other

A continuing threat is what to do in an emergency involving massive pollution with dangerous chemicals. The reason for the pollution occurring is beside the point. Protection of life, property, and the water resources downstream is mandatory.

Some irrigation projects and districts have mobile radio communications that could quickly spread an alarm about a slug of dangerous material in an irrigation facility. This would be helpful in getting diversions shut off to protect the irrigator's land, crops, or animals and prevent an uncontrollable spread of the material into the environment. Unfortunately, there is rarely any way to prevent this slug from reaching a natural stream.

Projects operated by the Bureau of Reclamation have Civil Defense and Emergency Disaster plans that can be put in action very quickly by specially trained personnel. Most irrigation districts must depend on county organizations for this service. It would appear that similar plans could be established for projects, districts, and counties, but much more than organizations and plans are necessary for effective containment.

In some instances, offstream ponds could be utilized to hold slugs of polluted water, but this becomes impractical where large volumes of water are involved. For example, the West Canal on the Columbia Basin Project in Washington can carry 5,100 c.f.s. A pond to contain this flow for six hours would have to have a capacity of about 2,500 acre-feet; or, if ten feet deep, it would cover 250 acres. Construction and maintenance of such facilities at strategic locations on a project for protection against a situation that may never occur seems unjustified unless all natural streams were likewise protected. This would probably sell to the public about as easily as the construction of public bomb shelters.

Some of the above-mentioned controls could be used on small systems, and indeed one form, the settling basin, is being used. For larger systems, however, there seem to be no emergency plans or facilities. The recent massive oil spills illustrate this fact quite well. Wherever there are people, accidental spills creating massive pollution problems will occur. The trick is to be able to take effective counteractions when and where needed.

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It is important to indicate that certain land management practices that cause minor deterioration of water quality for one purpose are beneficial for others. For example, salt accretions to groundwater or return flows from irrigation can diminish the usefulness of the water for certain specific purposes, but some accretions are necessary to maintain salt balance and productivity where irrigation agriculture is essential to the economy of the area. Also, in many areas the increased salt load in streams may be diluted by regulated reservoir releases.

Similarly, in irrigation canals, herbicides to control aquatic weeds, permit adequate canal flows, timely deliveries of adequate water, and reduced operation costs, provide a benefit to the water users and the community. They are not used in a manner that will leave residues hazardous to human health. In certain reservoirs herbicides beneficial in preventing algae blooms and associated aesthetic deterioration may adversely affect fish. The relative benefits of each use must be considered in evaluating such practices.

Similar examples may be given for other land management activities to indicate that water quality control, aimed at maintaining quality within established standards, must consider all uses.

ADDENDUM

PART I

(a) Executive Order 11288

(b) Budget Bureau Circular A-81

(c) Memorandum from Assistant Secretary
of Public Land Management
(November 18, 1968)

Title 3—THE PRESIDENT

EXECUTIVE ORDER 11288

PREVENTION, CONTROL, AND ABATEMENT OF WATER POLLUTION BY FEDERAL ACTIVITIES

By virtue of the authority vested in me as President of the United States and in furtherance of the purpose and policy of the Federal Water Pollution Control Act, as amended (33 U.S.C. 466), and Reorganization Plan No. 2 of 1966 (31 F.R. 6857), it is ordered as follows:

SECTION 1. *Policy.* The heads of the departments, agencies, and establishments of the Executive Branch of the Government shall provide leadership in the nationwide effort to improve water quality through prevention, control, and abatement of water pollution from Federal Government activities in the United States. In order to achieve these objectives—

(1) Pollution from all existing Federal facilities and buildings shall be controlled in accordance with plans to be submitted to the Director of the Bureau of the Budget pursuant to Section 3 of this order;

(2) New Federal facilities and buildings shall be constructed so as to meet the pollution control standards prescribed by Section 4 of this order;

(3) Pollution caused by all other operations of the Federal Government, such as water resources projects and operations under Federal loans, grants, or contracts, shall be reduced to the lowest level practicable;

(4) Review and surveillance of all such activities shall be maintained to assure that pollution control standards are met on a continuing basis;

(5) The Secretary of the Interior shall, in administering the Federal Water Pollution Control Act, as amended, provide technical advice and assistance to the heads of other departments, agencies, and establishments in connection with their duties and responsibilities under this order;

(6) The head of each department, agency, and establishment shall ensure compliance with Section 11 of the Federal Water Pollution Control Act, as amended (33 U.S.C.. 466h), which, as modified by Reorganization Plan No. 2 of 1966 (31 F.R. 6857), declares it to be the intent of Congress that Federal departments and agencies shall, insofar as practicable and consistent with the interests of the United States and within available appropriations, cooperate with the Secretary of the Interior and with State and interstate agencies and municipalities, in preventing or controlling water pollution; and

(7) Water pollution control needs shall be considered in the initial stages of planning for each new installation or project, and the head of each department, agency, and establishment shall establish appropriate procedures for securing advice and for consulting with the Secretary of the Interior at the earliest feasible stage.

SEC. 2. *Procedures for new Federal facilities and buildings.* (a) A request for funds to defray the cost of designing and constructing new facilities and buildings in the United States shall be included in the annual budget estimates of a department, agency, or establishment only if such request includes funds to defray the costs of such measures as may be necessary to assure that the new facility or building will meet the general standards prescribed by Section 4 of this order.

(b) Prior to any solicitation of bids for construction of any such new facility or building a description of the essential features of the water pollution control and treatment measures proposed for the project shall be submitted to the Secretary of the Interior for prompt review and advice as to the adequacy and effectiveness of the measures proposed and for advice as to any related operating procedures and continuing laboratory examinations deemed necessary to ensure effective plant operation.

SEC. 3. *Procedures for existing Federal facilities and buildings.* (a) In order to facilitate budgeting for corrective and preventive measures, the head of each department, agency, and establishment shall provide for an examination of all existing facilities and buildings under his jurisdiction in the United States and shall develop and present to the Director of the Bureau of the Budget, by July 1, 1966, a phased and orderly plan for installing such improvements as may be needed to prevent water pollution, or abate such water pollution as may exist, with respect to such buildings and facilities. Subsequent revisions needed to keep any such plan up-to-date shall be promptly submitted to the Director of the Bureau of the Budget. Future construction work at each such facility and the expected future use of the facility shall be considered in developing such a plan. Each such plan, and any revisions therein, shall be developed in consultation with the Secretary of the Interior in order to ensure that adoption of the measures proposed thereby will result in the prevention or abatement of water pollution in conformity with the general standards prescribed by Section 4 of this order.

(b) The head of each department, agency, and establishment shall present to the Director of the Bureau of the Budget, by July 1, 1967, and by the first of each fiscal year thereafter, an annual report describing the progress of his department, agency, or establishment in accomplishing the objectives of its pollution abatement plan.

SEC. 4. *General standards.* (a) Federal installations shall provide secondary treatment, or its equivalent, for all wastes except cooling water and fish hatchery effluents. Discharge of wastes into municipal sewerage systems maintaining adequate treatment is hereby declared to be the preferred method of disposal. However, whenever connection to such a system is not feasible, the department, agency, or establishment concerned shall be responsible for installing its own waste treatment system. Upon an application of the head of a department, agency, or establishment, a degree of treatment less than secondary may be approved with respect to an agency-installed system in an exceptional case if the Secretary of the Interior finds that a lesser degree of treatment is adequate to protect the quality of the receiving waters.

(b) If discharge of cooling water is expected to create problems by significantly increasing the temperature of the receiving waters, facilities shall be installed, or operating procedures shall be established, to maintain water temperatures within acceptable limits.

(c) Storage facilities for materials which are hazardous to health and welfare, and for oils, gases, fuels or other materials capable of causing water pollution, if accidentally discharged, shall be located so as to minimize or prevent any spillage which might result in water pollution. Engineering measures to entrap spillage, such as catchment areas, relief vessels, or entrapment-dikes, shall be installed so as to prevent accidental pollution of water.

(d) No waste shall be discharged into waters if it contains any substances in concentrations which are hazardous to health.

(e) No waste shall be discharged into waters if it contains any substances in concentrations which will result in substantial harm to domestic animals, fish, shellfish, or wildlife, if methods of treatment or disposal are available that will remove or render harmless such pollutants. If such methods are not available, but can reasonably be developed, they will be developed and used at the earliest possible date. A determination that such methods are not available or cannot reasonably be developed will not be made without the concurrence of the Secretary of the Interior.

(f) The head of each department, agency, and establishment shall, with respect to each installation in the United States under his jurisdiction, make, or cause to be made, such surveys as may be necessary to ensure that discharges of waste effluents from activities concerned with radioactivity are in accord with the applicable rules, regulations, or requirements of the Atomic Energy Commission (10 CFR, Part 20) and the policies and guidance of the Federal Radiation Council as published in the FEDERAL REGISTER.

(g) Construction and operating plans for waste treatment facilities shall include space for the conduct of necessary laboratory analyses and for the maintenance of records of results thereof whenever the size and complexity of the system makes this necessary.

(h) Construction and operating plans for waste treatment facilities shall take into account water quality standards promulgated pursuant to the provisions of the Water Quality Act of 1965 (79 Stat. 903).

(i) Any waste treatment facilities installed by any department, agency, or establishment shall as far as practicable be constructed so as to conform with any areawide program, meeting criteria established by the Secretary of Housing and Urban Development for a unified or officially coordinated areawide sewer facilities system as part of the comprehensively planned development of the area pursuant to Section 702(c) of the Housing and Urban Development Act of 1965, that may have been adopted with respect to the area concerned.

SEC. 5. *Modification of standards.* The standards prescribed by paragraphs (a) through (e) and (g) through (i) of Section 4 of this order may be supplemented or modified by the Secretary of the Interior, after consultation with the Director of the Bureau of the Budget. All such changes shall be published in the FEDERAL REGISTER.

SEC. 6. *Procedures for Federal water resources projects.* (a) The Secretaries of Agriculture and the Army, the Tennessee Valley Authority, and the United States Section of the International Boundary and Water Commission shall present for the consideration of the Secretary of the Interior any plans that they propose to recommend with respect to the authorization or construction of any Federal water resource development project in the United States. Such plans must be consistent with the general standards prescribed by Section 4 of this order to the fullest extent practicable. The Secretary of the Interior shall review such plans and supporting data relating to water quality, and shall prepare a report to the head of the responsible department, agency, or establishment describing the potential impact of the project on water quality, including recommendations concerning any changes or other measures with respect thereto which he considers to be necessary with respect to the design, construction, and operation of the project.

(b) The report of the Secretary of the Interior shall accompany any report proposing authorization or construction of such a water resource development project. In any case in which the Secretary of the Interior fails to submit a report within 90 days after receipt of project plans, the head of the department, agency, or establishment concerned may propose authorization or construction of the project without such an accompanying report. In any such case, the head of the department, agency, or establishment concerned shall explicitly state in his report concerning the project that the Secretary of the Interior has not reported on the potential impact of the project on water quality.

SEC. 7. *Review of facilities or operations supported by Federal loans, grants, or contracts.* (a) The head of each department, agency, and establishment shall conduct a review of the loan, grant, and contract practices of his organization to determine the extent to which water pollution control standards similar to those set forth in this order for direct Federal operations should be adhered to by borrowers, grantees, or contractors with respect to their operations in the United States. The head of each department, agency, and establishment shall review all such activities for which there is a significant potential for reduction of water pollution and develop appropriate recommendations for accomplishing such reduction. In conducting this review, necessary technical assistance should be sought from the Secretary of the Interior and the heads of other appropriate Federal agencies. A report on the results of this review shall be submitted to the Director of the Bureau of the Budget by July 1, 1966.

(b) The heads of departments, agencies, and establishments are encouraged to prescribe regulations covering loan, grant, or contract practices designed to reduced water pollution.

SEC. 8. *Study of water pollution from vessel operations.* The Secretary of the Interior shall make a comprehensive study of the problem of water pollution within the United States caused by the operation of vessels, and shall develop such recommendations for corrective or preventive action as may be appropriate, including recommendations with respect to vessels operated by any department, agency, or establishment of the Federal Government. The results of the study and recommendations shall be transmitted to the President by January 1, 1967. The study and report thereon shall be prepared in consultation with, and with the advice and assistance of, the Secretary of Defense, the Secretary of the Treasury, the Secretary of Commerce, and the Secretary of Health, Education, and Welfare.

SEC. 9. *Prior Executive order superseded.* Executive Order No. 11258 of November 17, 1965, is hereby superseded.

LYNDON B. JOHNSON

THE WHITE HOUSE,
July 2, 1966.

[F.R. Doc. 66-7460; Filed, July 5, 1966; 4:46 p.m.]

EXECUTIVE OFFICE OF THE PRESIDENT
BUREAU OF THE BUDGET
Washington, DC 20503

March 30, 1967

CIRCULAR NO. A-81

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Reporting requirements in connection with prevention, control and abatement of water pollution by Federal activities

1. Purpose. This Circular specifies the reporting procedures to be followed by departments and agencies in carrying out the provisions of Executive Order 11288 of July 2, 1966, entitled "Prevention, Control, and Abatement of Water Pollution by Federal Activities," hereinafter referred to as the Executive Order.

2. Cooperation between the Department of the Interior and other departments and agencies. Departments and agencies seeking the advice and assistance of the Department of the Interior (as required by section 3(a) of the Executive Order) with respect to compliance with the Executive Order should communicate with the Division of Federal Activities Coordination, Federal Water Pollution Control Administration, Department of the Interior, Washington, D. C. 20242, or with the appropriate Regional Director of that Administration (see attachment). Departments and agencies will cooperate in furnishing such pertinent data, including survey information concerning potential water pollution sources, as may be requested by the Division of Federal Activities Coordination.

3. Definitions. The following definitions will apply for purposes of this Circular:

a. "Installation" is defined as the same reporting entity used in the Annual Real Property Inventory reported to General Services Administration pursuant to Federal Property Management Regulations, subchapter A, part 101-3, unless an agency has obtained the approval of the Department of the Interior to use a different reporting unit. Requests for exceptions should be directed to the Division of Federal Activities Coordination in Washington, D. C.

b. "Federal installation" includes any building or facility owned by the Federal Government, whether or not it is operated by an agency of the Federal Government. It excludes any building or facility which is leased in whole or in part to the Federal Government, or which has been classified as surplus, except where an agency head determines in consultation with the Secretary of the Interior that exclusion of such a building or facility would seriously impair

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his ability to carry out his responsibility to abate pollution resulting from Federal activities. It also excludes buildings or facilities of the District of Columbia Government.

c. "Installation in the United States" includes those in the fifty States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam and American Samoa.

d. "Existing installation" includes those for which construction contracts have been awarded on or prior to the date of issuance of this Circular, as well as installations already in operation. Installations for which construction contracts will be awarded after the date of issuance of this Circular must meet the requirements and procedures specified by the Executive Order for new installations.

e. "Cost" of remedial measures is that amount which must be specifically provided for in the budget for the purpose of putting in place the necessary water pollution control measures. This will include design and engineering costs, the capital cost of structures, equipment and cost of installation, but not the annual maintenance and operating costs.

4. Plan for existing installations.

a. Requirement. The phased and orderly fiscal plan concerning improvements at existing installations, submitted to the Director of the Bureau of the Budget on July 1, 1966, as required by Executive Order 11288, will be updated and submitted by July 1, 1967, in the format described in paragraph 4 c below. The plan should cover conditions existing as of April 1, 1967. The agency plan should provide for compliance with the Executive Order at all installations by the end of fiscal year 1972.

b. Coverage. The plan will cover all existing Federal installations which are found by the agency to be below the general standards contained in the Executive Order.

c. Information required. The information required for the plan is to be submitted in the form of Exhibits A and B. Two copies of each will be submitted to the Bureau of the Budget and 12 to the Federal Water Pollution Control Administration, Division of Federal Activities Coordination. A statement in the form of Exhibit A will be submitted for each installation covered in the plan.

Summary financial data will be submitted in the form of Exhibit B. This summary should list all agency installations covered by the plan in the order of their recommended priority. Amounts in the total column of Exhibit B should equal the total amount indicated for each project in section 7 on Exhibit A.

d. Review. The Bureau of the Budget, with the cooperation of the Department of the Interior, will examine the plan submitted by each agency, and assign relative priorities to the various projects contained in the plans. Agencies will be notified of the outcome of this examination.

5. Annual progress reports. Annual fiscal progress reports, in the form of Exhibit C for each installation, describing progress in accomplishing the objectives of the pollution abatement plan, will be submitted to the Director of the Bureau of the Budget by July 1, 1967, and by the first of each fiscal year thereafter. The report should cover conditions as of April 1 of the preceding fiscal year. It will not be necessary to submit a report for installations where remedial measures have been completed prior to the year covered by the annual report.

Each report will contain information on congressional action if the installation's project(s) has been included in the President's budget. If the installation's project(s) has not been included in the President's budget, or if congressional action has not been completed on the request, the agency should so indicate. The report for each installation will also enumerate the specific prevention, control or abatement measures which have been completed at each installation during the year covered by the report, and the progress on remedial measures for which work has been started but not completed.

If changed conditions, such as the nature or volume of the water pollutant discharged, have caused a previously nonpolluting installation to contribute to pollution, a statement in the form of Exhibit A will be submitted for that installation as part of the agency's annual report. If such changed conditions, unanticipated budgetary action, or other factors have made revisions in the agency's overall control plan necessary, a revised plan in the form of Exhibit B also will be submitted as part of the annual report.

6. Inquiries. Inquiries to the Bureau of the Budget about this Circular should be addressed to the Resources and Civil Works Division (code 103, extension 4750).

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PHILLIP S. HUGHES
Acting Director

Attachments

EXHIBIT A
Circular No. A-81

(Name of Agency)

(Bureau)

Water Pollution Control--Requirements Planned by Installation

(Date)

1. Name of installation and GSA inventory control number

   Albemarle Arsenal--#546307

2. Location of installation (State, County, and Town or City)

   Utah, Jefferson County, Albemarle

3. Location of point(s) of discharge and Federal enforcement action taken, if any

   Effluent from primary sewage treatment plant, Albemarle Arsenal, discharges into Jefferson River. Arsenal was cited in the Tri-State enforcement action, October 20, 1965.

4. Nature and amount of pollutant being discharged

   3 million gallons/day of domestic sewage

5. Existing level of control being provided and effectiveness in removing the significant pollutants at this installation

   Primary treatment plant consisting of bar screen, grit chamber, chemical floculator with mechanical mixing, primary settling tanks, and sludge digestor. Average BOD removal of 50%. Average suspended solids removal of 60%.

6. Remedial measures proposed and estimated effectiveness in removing the significant pollutants at this installation.

   Installation of secondary treatment consisting of two high-rate trickling filters and secondary clarifier. Would provide average BOD removal of 90% and average suspended solids removal of 92%.

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7. Cost of remedial measures (in thousands of dollars)

Total cost: $800 for trickling filters and clarifier

Cost by fiscal years: 1968: $50 for design and engineering studies

1969:$750 for construction

8. Title and symbol of account under which costs will be appropriated

Construction 99X1111

EXHIBIT B
Circular No. A-81

(Name of Agency)
(Bureau)

Water Pollution Control--Summary Financing Plan

(In thousands of dollars)

Name of installation (list in order of recommended priority) and location	NOA for Remedial Measures Proposed 1968	1969	1970	1971	1972	TOTAL
1. Albemarle Arsenal, Albemarle, Utah........	50	750				800
2. Jones Air Force Base, Reno, Nevada........		50	200	300		550
TOTAL, NOA, all facilities	50	800	200	300		1,350

EXHIBIT C
Circular No. A-81

(Name of Agency)

(Bureau)

Water Pollution Control--Annual Progress Report by Installation, FY 19--

(Date)

1. Name of installation and GSA inventory control number

   Albemarle Arsenal--#546307

2. Location of installation (State, County, and Town or City)

   Utah, Jefferson County, Albemarle

3. Budgetary action (in thousands of dollars)

   a. In 19-- Budget submitted to Congress: $50

   b. Congressional action: $50

4. Progress on remedial measures

   A contract has been let for design and engineering studies.

Note: The example illustrates how a project, shown in Exhibits A and B as a proposed project, would appear after having been approved for inclusion in the President's budget, funds appropriated by the Congress, and the contract let for design and engineering studies.

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

NOV 18 1968

Memorandum

To : ✓Commissioner, Fed. Water Pollution Control Admin.
  Through: Asst. Secy. - Water Quality & Research
Director, National Park Service
Director, Bureau of Sport Fisheries & Wildlife
  Through: Asst. Secy. - Fish & Wildlife, Parks, and Marine Resources
Commissioner, Bureau of Reclamation
  Through: Asst. Secy. - Water & Power Development
Director, Bureau of Land Management
Commissioner, Bureau of Indian Affairs

From : Assistant Secretary - Public Land Management

Subject: Compliance with Executive Order 11288 to Prevent, Control or Abate Water Pollution that may be Caused by Land Conservation Measures or Land Management Practices

The subject Executive Order outlines procedures for existing and new facilities and buildings, for major water resources projects and for facilities or operations supported by Federal loans, grants or contracts. It does not, however, set forth specific procedures for land conservation measures or management practices. These activities carried out by the Federal Government often have an impact on water quality and it is important that they be reviewed with the Federal Water Pollution Control Administration to insure that the objectives set forth in Executive Order 11288 are being achieved.

There have been correspondence and meetings on this subject with representatives of the Interior agencies engaged in land management and application of conservation measures, with the FWPCA, and with the Assistant Secretary - Water Quality and Research. As a result, it is deemed advisable to review the measures and practices being applied in a limited area to more definitely determine the kind, size and location of operations not covered by existing review procedures which have an impact on water quality, and furthermore, to establish a procedure whereby the FWPCA will provide assistance and recommendations to the operating agencies.

The State of Oregon has been selected for this initial pilot review. Although, all of the land managing agencies are not involved in Oregon, we felt it was an ideal location for the pilot review. It is envisioned that the appropriate field personnel will meet and conduct the Oregon review under the leadership of Mr. James Agee, Northwest Regional Director, FWPCA. He will arrange the details with the appropriate State, Regional and Area Offices of the other participating agencies.

The kinds of conservation measures we believe should be considered in this review are:

- Brush Control
- Erosion Control Checks
- Contouring and Terracing
- Seeding
- Bank Protection
- Diversions - Water spreading
- Livestock Water Ponds
- Detention Dams
- Dikes
- Deep Tillage

The kinds of management practices or operations that should be considered are:

- Timber Management
- Grazing Systems
- Road Construction and Maintenance

The application of chemicals in connection with any of the above conservation measures or management practices should be specifically studied.

Certainly some of these operations may be handled by contract and would be subject to the procedures established for implementation of Section 7, Executive Order 11288. There may be other operations that are not so covered and they should be identified.

Enclosed for your information are copies of Executive Order 11288, the Secretary's memorandum of May 25, 1967, relating to implementation of Section 7 of the Order, and Assistant Secretary Edwards' memorandum of May 13, 1968, concerning land conservation measures.

Harry R. Anderson

Enclosures

ADDENDUM

PART II

(a) Alsea Watershed Study (March 1967)

(b) Description of Land Conservation Measures

(c) Oregon State Water Quality Standards

ALSEA WATERSHED STUDY

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ALSEA WATERSHED STUDY

To determine the effects of logging on aquatic resources

This pamphlet has been prepared by the research cooperators as a guide to the study area and an outline of the research underway. Further information on the study can be obtained from the publications listed in the back, or by writing the project coordinator:

Dr. James D. Hall
Department of Fisheries and Wildlife
Oregon State University
Corvallis, Oregon 97331

March 1967

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Acknowledgements

The Alsea Watershed Study has been a cooperative effort involving many state and federal agencies and also several private corporations and individuals. Without this cooperation an undertaking of this magnitude would have been impossible. The list of contributors to the logging study is shown below; present cooperators are shown with an asterisk.

*Oregon State University
School of Forestry
Agricultural Experiment Station
Department of Fisheries and Wildlife
Department of Botany
Department of Entomology

*Oregon State Game Commission

*U. S. Geological Survey

*Federal Water Pollution Control Administration

*U. S. Forest Service

U. S. Public Health Service

Governor's Committee on Natural Resources

Oregon Cooperative Wildlife Research Unit

Oregon State Board of Forestry

Oregon State Sanitary Authority

*Georgia-Pacific Corporation

Timber Access Industries, Inc., Corvallis

Stokes Lumber Company, Corvallis

*Mr. Fred Williamson, Toledo

ALSEA WATERSHED STUDY

Can Oregon's salmon and trout resource survive and prosper along with its vital timber industry? For many years the question has been debated on the basis of very few facts. Oregon's growing population, with its increased needs for both wood products and recreational opportunities, demands that a satisfactory answer be reached without delay.

A stream and its fish population are greatly influenced by events on the surrounding watershed. Resource managers in Oregon have long been concerned over the possible effects of logging on water quality and fish production. This concern led to the present study, which was established by the Governor's Committee on Natural Resources in 1958 as part of the Alsea Watershed Study. Now coordinated by Oregon State University, the work is designed to provide a basis for obtaining the maximum benefit from the many resources present on a watershed, including timber, fisheries, and an abundant, clean water supply.

Aims - The objective of the study is to compare the effects of two patterns of Douglas-fir logging on the fish and other aquatic resources in small headwater streams. The inability of young Douglas-fir to tolerate shade requires that the species be clear-cut to achieve successful reproduction. Clear-cut logging of an entire watershed is being compared to clear-cutting in staggered settings where about 30 percent of the area will be harvested and a strip of vegetation will be left along the stream.

Description of the Area - Three adjacent watersheds were chosen for intensive study. Two of them, Deer Creek and Flynn Creek, are in U. S. Forest Service ownership. The third, Needle Branch, is largely owned by Georgia-Pacific Corporation. They are all tributaries of Drift Creek, a stream which flows into Alsea Bay near Waldport (See map inside back cover.) The watersheds were forested with 90 to 100-year-old stands of Douglas-fir and small percentages of red alder and other species. The three study streams supported good runs of coho salmon and cutthroat trout, fish important to both sport and commercial fishermen.

Method of Study - As a basis for later comparison it was important to get a complete description of the area before logging. Seven years were spent in a pre-logging inventory of the water resources and fish populations in the three basins. During 1966, two of the watersheds were harvested. Deer Creek, the larger (770 acres), was cut in staggered settings. Needle Branch, the smaller (175 acres), was entirely clear-cut. The streams will be studied for an additional seven years after logging to determine immediate and long-term changes. Flynn Creek (540 acres) will remain uncut for the entire 15-year period to provide a further comparison with normal conditions. In order to study the effects of roads independently from the logging operation itself, all logging roads were built into Deer Creek and Needle Branch in 1965, a year before the timber harvest.

Research Cooperators - A study of the interwoven resources in a watershed involves extensive cooperation between scientists and land managers in many fields. Foresters, soil scientists, biologists, engineers, chemists and others have worked together to collect the information needed. Researchers at Oregon State University are cooperating with personnel of the Oregon State Game Commission, U. S. Geological Survey, Federal Water Pollution Control Administration, and the U. S. Forest Service to conduct studies in the area. The most extensive research effort is in fishery investigations, supported for the most part by Game Commission financing and personnel. The Federal Water Pollution Control Administration has supported much of the University work through a research grant.

The land-owners have also made a substantial contribution to the success of the study. The Georgia-Pacific Corporation made a financial contribution to the research, provided access to their lands, and conducted the logging on Needle Branch. The U. S. Forest Service administered the timber sale on Deer Creek, awarded to Timber Access Industries, Inc., of Corvallis. Mr. Fred Williamson of Toledo has kindly allowed access to his land on Needle Branch and modified his cutting plans to conform to the study schedule, as did the Stokes Lumber Company, owner of timber rights on Mr. Williamson's property. The cooperation of all these has made the study possible.

Highlights of the Research

Hydrologic Studies

Many of the studies in this cooperative project are focused upon the hydrology of the three watersheds. There is a close relationship between aquatic life and the physical and chemical characteristics of the water in which it lives. Thus it is important that any changes after logging in the physical and chemical characteristics of the water, or the seasonal patterns of streamflow, be followed closely. It is also important to study the factors affecting these characteristics of the water. Organizations at Oregon State University, the School of Forestry and the Water Resources Research Institute, are cooperating with the U. S. Geological Survey, the Federal Water Pollution Control Administration, and the U. S. Forest Service in such a program.

The Soil-Vegetation Survey - In 1962, the Department of Soils at Oregon State University, in cooperation with the U. S. Forest Service, Bureau of Land Management, Soil Conservation Service, State Board of Forestry, and private land owners, completed a detailed soil-vegetation survey of the entire Alsea River basin. Particular attention was given to the three watersheds of the logging study. The information has served as a guide for description and analysis of the watersheds. Detailed information about erodibility and water-holding characteristics of the soils has provided a comparison of the three watersheds before logging and may help to explain differences in streamflow patterns or sedimentation after road construction and logging.

Streamflow, Sediment, and Water Temperature - The U. S. Geological Survey and the Oregon State University School of Forestry are measuring streamflow, suspended sediment, and water temperature on the three watersheds. The purpose is to relate changes that might occur in the physical characteristics of the water and the streamflow patterns of Deer Creek and Needle Branch to logging practices on these watersheds.

The Geological Survey has measured streamflow, sediment, and water temperature at the outlets of the three large watersheds since 1958. Streamflow and temperature are measured continuously at these gaging stations. Sediment loads are measured intensively during storm periods and periodically between storms. The information will permit analysis of the integrated effects of logging over an entire watershed.

The School of Forestry is interested in evaluating the effects of logging in detail within the larger watersheds. As a result, an extensive network of stream gages, sediment sampling points, and thermographs has been placed into operation in Needle Branch and Deer Creek. Six stream gaging stations and sediment sampling points have been placed in Deer Creek in order to evaluate the effect of each cutting unit on the entire stream. Twelve thermograph stations have been installed in Deer Creek along with seven in Needle Branch to provide additional temperature data. Most of these stream gaging stations have been in continuous operation since the fall of 1962; the thermograph stations since 1964. Location of the stream gaging network is illustrated on the map on the back cover.

The School of Forestry has initiated additional sediment and water temperature studies within the watersheds. A graduate student recently completed a detailed comparison of various techniques used to evaluate erosion from the cut and fill slopes of newly-completed logging roads. Results from the study will aid forest engineers and research personnel throughout the Northwest in determining the most suitable technique for evaluating soil losses from cut and fill slopes.

Another graduate student has completed a stream temperature prediction study using radiation from the sun and other meteorological factors. Like the erosion study above, the research is designed to give management and research personnel a tool for predicting the effect of logging practices on stream temperature. Prediction of stream temperature will enable aquatic biologists to anticipate the response of the aquatic community.

Chemical and Bacteriological Quality - The Federal Water Pollution Control Administration has been monitoring the chemical and bacteriological constituents of the water in all three streams since 1964. Regular samples are taken each month, and additional samples are taken during the storm season. A wide range of determinations is included in the analyses, among them sodium, phosphorus, potassium, nitrogen, and fecal coliform bacteria.

Fishery Studies

The pre-logging inventory of existing conditions has given considerable insight into the requirements of salmon and trout in small headwater tributaries. The research findings have emphasized the importance of very small streams in maintaining runs of salmon and trout.

The first requirement for salmon is adequate spawning gravel. During the spawning process eggs are buried by the female salmon to a depth of 10 to 12 inches. Fishery biologists of the Oregon State Game Commission have intensively studied the conditions in spawning gravel by means of a perforated standpipe. The device is driven into the streambed and permits sampling of the water that is flowing through the gravel at the depth the eggs are buried. Survival of the young salmon fry in the gravel has been evaluated by a "fry trap" developed by the Game Commission. This nylon mesh trap captures all of the young fish that emerge from the redd, or nest, of a single female salmon. The percentage of fry that survive to emergence can be determined, based on an estimate of the number of eggs deposited.

The studies have indicated that heavy mortality often occurs in the gravel, and that several conditions are necessary for good survival of salmon fry in the gravel. Chief among these are 1) a high level of dissolved oxygen in the intra-gravel water, and 2) a suitable exit route out of the gravel to the surface. These conditions are directly influenced by the amount of fine sediment in the gravel.

In spawning areas that contain considerable silt, stream water (high in dissolved oxygen) is prevented from mixing with water flowing through the gravel. This prevents renewal of the oxygen supply as the eggs use it, and many eggs thus suffocate in the gravel. The prelogging study has indicated that natural siltation has another adverse effect on the survival of fry. By closing off escape routes in the gravel spawning beds, the fine sediments trap young fish in the gravel and prevent them from reaching the surface. These findings have been experimentally verified in the laboratory by adding fine sediment to good spawning gravel and observing the mortality caused by increasing amounts of sediments.

The young coho salmon spend about one year in the stream before moving to the ocean. The importance of adequate food (small insects) and moderate temperatures for the survival and growth of young salmon during this period has been brought to light in studies underway by biologists from the Department of Fisheries and Wildlife at Oregon State University. Fish traps provide a count of spawning salmon moving into the study streams. Young salmon leaving the streams for the ocean are also counted. The figures show that young salmon normally undergo a high rate of mortality in freshwater. From the average of 60,000 to 80,000 eggs deposited each year in Deer Creek by 25 to 30 spawning females, for example, only about 2,500 will survive to go to the ocean a year later as fingerlings. Over the thousands of years of its evolution, the salmon has become adapted to these natural sources of mortality. This study will measure its resiliency in the face of changes in the watershed caused by logging.

Other Biological Studies - Other studies are underway at Oregon State University to determine the effects of logging on other forms of stream life, such as algae and insects, upon which the fish depend for their food. Energy from sunlight is the basis of all food that fish eventually eat. It is converted into useful forms either by the green algae on the gravel in the stream or by streamside vegetation that falls into the stream. This vegetation is eaten by aquatic insects that are in turn food for the fish. These studies will enable a comparison of the abundance of fish food in a logged watershed where the streamside vegetation will be completely removed and in one where this vegetation will remain intact.

Initial Results of Logging - Although it is too soon to judge the full effect of logging on water quality and the fish populations, some results from the summer and fall of 1966 can be reported at this time. Decomposition of logging debris remaining in the stream channel, and ponding of water by debris dams, caused a substantial decrease in the concentration of dissolved oxygen in certain parts of Needle Branch, the clear-cut watershed. About one-third of the original rearing area was made uninhabitable for coho salmon and cutthroat trout from June through

August because of low dissolved oxygen content. After the stream channel was cleared of debris in September the stream flowed freely throughout the length of the study area, and oxygen levels in the surface water increased to pre-logging levels.

The maximum observed temperature in this same area increased 16° F (from 59° to 75° F), and diurnal temperature fluctuations increased greatly. Slash burning in October created a hazard to fish life by raising water temperature to lethal levels in parts of the stream where the fire burned hottest.

After fall rains had flushed out some of the accumulated fine debris, intragravel oxygen levels increased, and spawning gravels were uncovered. In the winter of 1966-67, spawning coho salmon ascended the stream in numbers approximating the pre-logging average.

In the summer and fall of 1966, similar measurements on Deer Creek revealed no significant changes in water temperature or dissolved oxygen. No logging debris reached the stream, and streamside vegetation remained intact on this watershed.

The significance of these early effects on the fish population in Needle Branch will be assessed in the spring of 1967 by counting the seaward migration of young coho salmon that survived conditions of low oxygen and high water temperature during logging and burning. The trapping of salmon fry emerging from the gravel in the spring of 1967 will enable us to evaluate the effect of sedimentation on the suitability of the spawning gravels.

It would be premature to draw conclusions from the study without further evaluation. Some changes that have occurred in Needle Branch are expected to improve it as a habitat for fish. There are now more deep pools than there were prior to logging. The increased volume of stream flow to be expected next summer as a result of timber harvest should provide more living space for fish than existed previously. The job of stream clearance was well conducted, and the stream has begun a return to its original condition. The watershed has been reseeded to Douglas-fir, and other vegetation is beginning to sprout.

The research program will continue for several years in order to determine the duration and extent of these changes and their effect on fish populations and water quality in these logged watersheds. The interactions of logging on a stream are complex. Only research can provide definite answers to the many important questions relating to the effects of logging on water quality and fishery resources in the State of Oregon.

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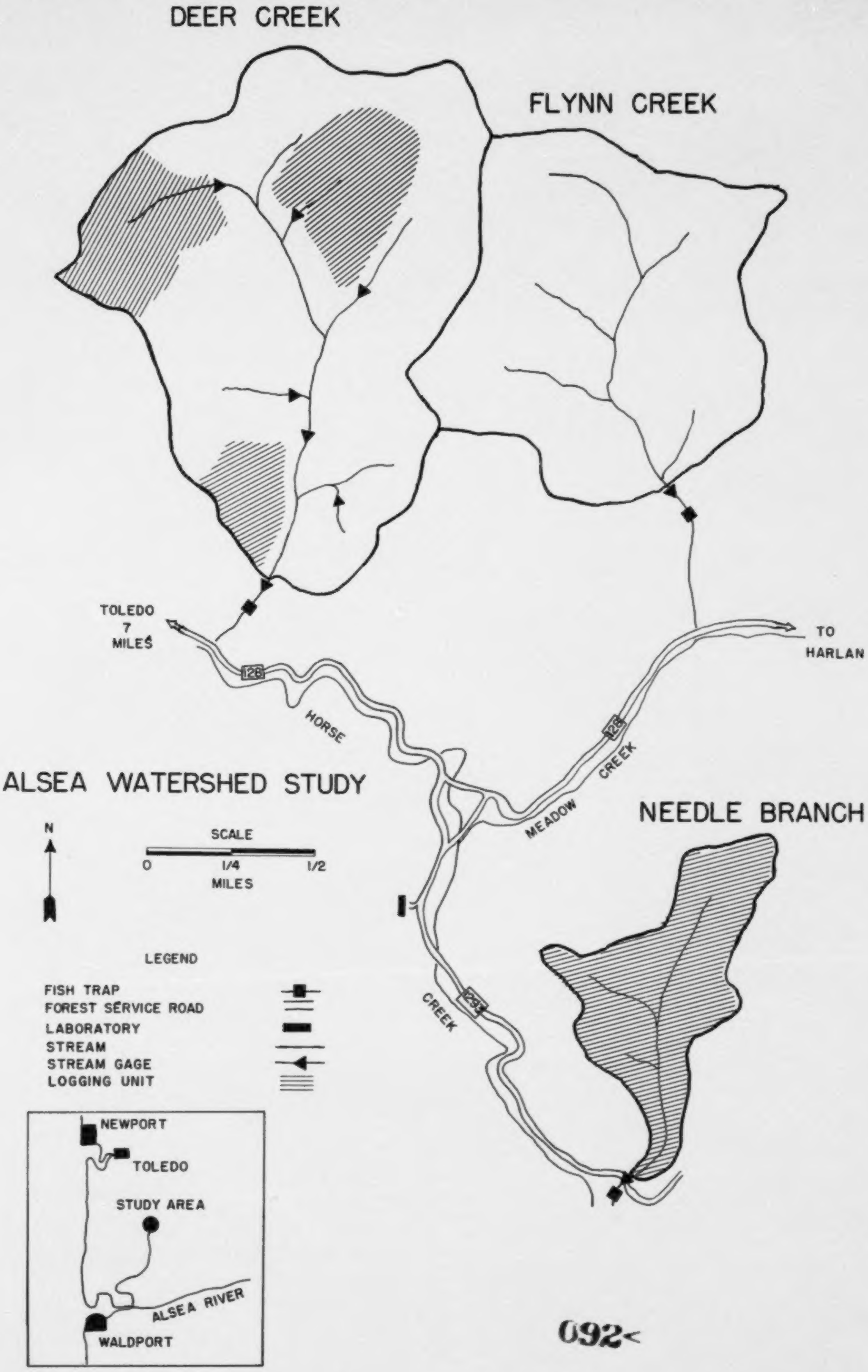

ALSEA WATERSHED STUDY

DEER CREEK
FLYNN CREEK
NEEDLE BRANCH
TOLEDO 7 MILES
TO HARLAN
126
HORSE
MEADOW
CREEK
CREEK
229
N
SCALE
0
1/4
1/2
MILES
LEGEND
FISH TRAP
FOREST SERVICE ROAD
LABORATORY
STREAM
STREAM GAGE
LOGGING UNIT
NEWPORT
TOLEDO
STUDY AREA
ALSEA RIVER
WALDPORT

092<

LAND CONSERVATION MEASURES

DESCRIPTION

Seeding and Planting: Establishing adapted grasses (primarily native) or legumes by seeding on rangeland or on land converted to range from other uses; spreading tree seed by hand or by mechanical means in open areas or understocked woodlands to establish an adequate stand; planting tree seedlings or cuttings to establish a stand of forest trees; stabilizing silt-producing and severely eroded areas by establishing vegetative cover. This includes woody plants, such as trees, shrubs, or vines, and adapted grasses or legumes established by seeding or sodding to provide long-term ground cover.

Brush and Weed Control: Killing or suppressing brush and weeds by mechanical, chemical, biological, or other means.

Pest and Disease Control: Killing or suppressing insects and diseases by mechanical, chemical, or other means.

Slash Burning and Disposal: Clearing snags and other timber debris from cut-over areas.

Water Development: Improving springs and seeps by excavating, cleaning, capping, or providing collection and storage facilities; a well constructed or improved to provide water for irrigation, livestock, or recreation; a pond made by constructing a dam or embankment.

Grazing Systems: Grazing land at an intensity which will maintain adequate cover for soil protection and maintain or improve the quantity and the quality of desirable vegetation; rotating or deferring grazing on rangeland for a prescribed period during any growth period of the year.

Hydrolic Structures and Systems: Storing, diverting, or checking water runoff from natural channels or gullies by means of dams, dikes, ditches, and spreading it over relatively flat areas.

Watershed Tillage: Soil manipulation including trenching and furrowing, ripping, pitting, contouring, and terracing.

Stream Debris Removal: Removing snags, drifts, or other obstructions within the channel.

Streamside Buffer Strips: Stabilizing and protecting banks of streams against scour and erosion by vegetative means.

Bank Leveling: Stabilizing the channel of a stream by leveling the banks to restore fish habitat.

Rock Riprap and Gabions: Placing obstructions in streams to develop or restore fish habitat.

Spawning Gravel Replacement: Restoring or developing artificial and rearing grounds by cleaning or adding gravel and excavating pools.

Fish Hatcheries: The rearing of fry and fingerlings to increase the production of fish.

Sanitation Controls: Adequate sewage treatment and disposal facilities to protect the quality of surface and groundwater.

Road and Trail Relocating: Relocating roads and trails when they encroach streams, contribute sediments, or destroy streamside vegetation.

Fencing and Cattle Guards: Constructing fences to restrict and control livestock movements.

Salting: Salting away from water to distribute livestock and wildlife.

Stock Trails: A livestock trail or cattle walkway constructed to improve access to grazing areas.

Irrigation: A planned system where all necessary water control structures have been installed for the efficient distribution of irrigation water, from the source of supply to one or more farms.

People Controls: A planned system where all necessary structures have been constructed to control the use of recreation areas by masses of people.

ADDENDUM

Division 1

WATER POLLUTION

Subdivision 1

STANDARDS OF QUALITY FOR PUBLIC WATERS OF OREGON AND DISPOSAL THEREIN OF SEWAGE AND INDUSTRIAL WASTES

[ED. NOTE: Unless otherwise specified sections 11-005 through 11-070 of this chapter of the Oregon Administrative Rules Compilation were adopted by the Sanitary Authority June 1, 1967, and filed with the Secretary of State June 1, 1967 as Administrative Order SA 26. Repeals Administrative Order SA 8.]

Statutory Authority: ORS 449.080; 449.086

11-005 DEFINITIONS. As used in this subdivision unless otherwise required by context:

(1) "Sewage" means the water-carried human or animal waste from residences, buildings, industrial establishments or other places together with such ground water infiltration and surface water as may be present. The admixture with sewage as above defined of industrial wastes or wastes, as defined in subsections (2) and (3) of this section, shall also be considered "sewage" within the meaning of this division.

(2) "Industrial waste" means any liquid, gaseous, radioactive or solid waste substance or a combination thereof resulting from any process of industry, manufacturing, trade or business, or from the development or recovery of any natural resources.

(3) "Wastes" means sewage, industrial wastes, and all other liquid, gaseous, solid, radioactive, or other substances which will or may cause pollution or tend to cause pollution of any waters of the state.

(4) "Pollution" means such contamination or other alteration of the physical, chemical or biological properties of any waters of the state, including change in temperature, taste, color, turbidity, silt or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive or other substance into any waters of the state which either by itself or in connection with any other substance present, will or can reasonably be expected to create a public nuisance or render such waters harmful, detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational or other legitimate beneficial uses or to livestock, wildlife, fish or other aquatic life or the habitat thereof.

(5) "Waters of the state" include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

(6) "Marine waters" means all oceanic, offshore waters outside of estuaries or bays and within the territorial limits of the state of Oregon.

(7) "Estuarine waters" means all mixed fresh and oceanic waters in estuaries or bays from the point of oceanic water intrusion inland to a line connecting the outermost points of the headlands or protective jetties.

(8) "Standard" or "standards" means such measure of quality or purity for any waters in relation to their reasonable and necessary use as may be established by the Sanitary Authority pursuant to ORS Chapter 449.

(9) "Fish and other aquatic life" means all beneficial fishes, crustacea, mollusks, plankton, higher aquatic plants, and waterfowl.

11-010 HIGHEST AND BEST PRACTICABLE TREATMENT AND CONTROL REQUIRED. Notwithstanding the general and special water quality standards contained in this subdivision, the highest and best practicable treatment and/or control of wastes, activities and flows shall in every case be provided so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor and other deleterious factors at the lowest possible levels.

11-015 RESTRICTIONS ON THE DISCHARGE OF SEWAGE AND INDUSTRIAL WASTES AND HUMAN ACTIVITIES WHICH AFFECT WATER QUALITY IN THE WATERS OF THE STATE. No wastes shall be discharged and no activities shall be conducted such that said wastes or activities either alone or in combination with other wastes or activities will violate or can reasonably be expected to violate, any of the general or special water quality standards contained in this subdivision.

11-020 MAINTENANCE OF STANDARDS OF QUALITY. (1) The degree of waste treatment required to restore and maintain the above standards of quality shall be determined in each instance by the State Sanitary Authority and shall be based upon the following:

(a) The uses which are or may likely be made of the receiving stream.

(b) The size and nature of flow of the receiving stream.

(c) The quantity and quality of the sewage or wastes to be treated, and

(d) The presence or absence of other sources of pollution on the same watershed.

(2) All sewage shall receive a minimum of secondary treatment or equivalent (equal to at least 85% removal of 5-day biochemical oxygen demand and suspended solids) and shall be effectively disinfected before being discharged into any public waters of the state.

11-025 GENERAL WATER QUALITY STANDARDS. The following General Water Quality Standards shall apply to all waters of the state except where they are clearly superseded by Special Water Quality Standards applicable to specifically designated waters of the state. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in any waters of the state:

(1) The dissolved oxygen content of surface waters to be less than six (6) milligrams per liter unless specified otherwise by special standard.

(2) The hydrogen-ion concentration (pH) of the waters to be outside the range of 6.5 to 8.5 unless specified otherwise by special standard.

(3) The liberation of dissolved gases, such as carbon-dioxide, hydrogen sulfide or any other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such waters.

(4) The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation or industry.

(5) The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish.

(6) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation or industry.

(7) Objectionable discoloration, turbidity, scum, oily sleek or floating solids, or coat the aquatic life with oil films.

(8) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or be otherwise injurious to public health.

(9) Any measurable increase in temperature when the receiving water temperatures are 64° F. or above, or more than 2° F. increase when receiving water temperatures are 62° F. or less.

(10) Aesthetic conditions offensive to the human senses of sight, taste, smell or touch.

(11) Radioisotope concentrations to exceed Maximum Permissible Concentra-

tions (MPC's) in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products or pose an external radiation hazard.

11-030 BENEFICIAL USES OF WATERS TO BE PROTECTED BY SPECIAL WATER QUALITY STANDARDS. The Special Water Quality Standards contained in this subdivision are adopted for the purpose of protecting, together with pertinent general water quality standards, the beneficial uses of specified waters of the state as set forth in Table A and to conserve the waste assimilative capacity of the waters so as to accommodate maximum development and utilization of the resources of the state.

11-035 SPECIAL WATER QUALITY STANDARDS FOR PUBLIC WATERS OF GOOSE LAKE IN LAKE COUNTY. The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-025, except where this section imposes a conflicting requirement with the provisions of Section 11-025, this section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in the waters of Goose Lake:

(1) Dissolved Oxygen. (DO). DO concentrations to be less than 7 milligrams per liter.

(2) Organisms of the Coliform Group Where Associated with Fecal Sources. (MPN or equivalent MF using a representative number of samples). Average concentrations of coliform bacteria to exceed 1000 per 100 ml, with 20% of samples not to exceed 2400 per 100 ml.

(3) Hydrogen Ion Concentration. (pH). pH values to be outside the range of 7.5 to 9.5.

(4) Temperature. Daily average temperatures to exceed 70° F. or the daily mean ambient air temperature, whichever is greater.

11-040 SPECIAL WATER QUALITY STANDARDS FOR PUBLIC WATERS OF THE MAIN STEM KLAMATH RIVER. The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-025, except where this section imposes a conflicting requirement with the provisions of Section 11-025, this section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in the waters of the Klamath River:

(1) Dissolved Oxygen. (DO).

(a) (Main stem Klamath River from Klamath Lake to Keno Regulating Dam located approximately 16 river miles above the Oregon-California border). DO concentrations of surface waters to be less than 5 milligrams per liter unless caused by natural conditions.

(b) (Main stem Klamath River from Keno Regulating Dam to Oregon-California border). DO concentrations to be less than 7 milligrams per liter.

(2) Organisms of the Coliform Group Where Associated with Fecal Sources. (MPN or equivalent MF using a representative number of samples). Average concentrations of coliform bacteria to exceed 1000 per 100 ml, with 20% of samples not to exceed 2400 per 100 ml.

(3) Turbidity. (Jackson Turbidity Units, JTU). Turbidities to exceed 5 JTU above natural background values except for certain short-term activities which may be specifically authorized by the Sanitary Authority under such conditions as it may prescribe and which are necessary to accommodate essential dredging or construction where turbidities in excess of this standard are unavoidable.

(4) Temperature. Any measurable increase when river temperatures are 72° F. or above, or more than 2° F. cumulative increase when river temperatures are 70° F. or less.

(5) Dissolved Chemical Substances. (Main stem Klamath River at the Oregon-California border). Conductivity to exceed 400 micromhos at 77° F.

(6) Hydrogen Ion Concentration. (pH). pH values to be outside the range of 7.0 to 9.0.

11-045 SPECIAL WATER QUALITY

STANDARDS FOR THE PUBLIC WATERS OF MULTNOMAH CHANNEL AND THE MAIN STEM WILLAMETTE RIVER. The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-025, except where this section imposes a conflicting requirement with the provisions of Section 11-025, this section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in the waters of Multnomah Channel or the Willamette River:

(1) Dissolved Oxygen. (DO).

(a) (Multnomah Channel and main stem Willamette River from mouth to the Willamette Falls at Oregon City, river mile 26.6). DO concentrations to be less than 5 milligrams per liter.

(b) (Main stem Willamette River from the Willamette Falls to Newberg, river mile 50). DO concentrations to be less than 6 milligrams per liter.

(c) (Main stem Willamette River from Newberg to Salem, river mile 85). DO concentrations to be less than 7 milligrams per liter.

(d) (Main stem Willamette River from Salem to confluence of Coast and Middle Forks, river mile 187). DO concentrations to be less than 90% of saturation.

(2) Organisms of the Coliform Group Where Associated with Fecal Sources. (MPN or equivalent MF using a representative number of samples). Average concentrations of coliform bacteria to exceed 1000 per 100 ml, with 20% of samples not to exceed 2400 per 100 ml.

(3) Turbidity. (Jackson Turbidity Units, JTU). Turbidities to exceed 5 JTU above natural background values except for certain short-term activities which may be specifically authorized by the Sanitary Authority under such conditions as it may prescribe and which are necessary to accommodate essential dredging or construction where turbidities in excess of this standard are unavoidable.

(4) Temperature.

(a) (Multnomah Channel and main stem Willamette River from mouth to Newberg, river mile 50.) Any measurable increase when river temperatures are 70° F. or above, or more than 2° F. increase when river temperatures are 68° F. or less.

(b) (Main stem Willamette River from Newberg to confluence of Coast and Middle Forks, river mile 187). Any measurable increase when river temperatures are 64° F. or above, or more than 2° F. increase when the river temperatures are 62° F. or less.

(5) Dissolved Chemical Substances. Guide concentrations listed below to be exceeded except as may be specifically authorized by the Sanitary Authority upon such conditions as it may deem necessary to carry out the general intent of Section 11-010 of this subdivision and to protect the beneficial uses set forth in Table A.

	mg/l
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.01
Chloride (Cl)	25.
Chromium (Cr)	0.05
Copper (Cu)	0.005
Cyanide (CN)	0.01
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	100.
Zinc (Zn)	0.1
Heavy metals (Totals including Cu, Pb, Zn, and others of non-specific designation)	0.5

11-050 SPECIAL WATER QUALITY STANDARDS FOR THE PUBLIC WATERS OF THE MAIN STEM OF THE COLUMBIA RIVER FROM THE EASTERN OREGON-WASHINGTON BORDER WESTWARD TO THE PACIFIC OCEAN. The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-025, except where this section imposes a conflicting requirement with the provisions of Section 11-025, this section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in the waters of the Columbia River:

(1) Dissolved Oxygen. (DO). DO concentrations to be less than 90% of saturation.

(2) Organisms of the Coliform Group where Associated with Fecal Sources. (MPN or equivalent MF using a representative number of samples).

(a) (From the eastern Oregon-Washington boundary downstream to the Interstate Highway 5 bridge between Vancouver, Washington, and Portland, Oregon). Average concentrations of coliform bacteria to exceed 240 per 100 milliliters or to exceed this value in more than 20 percent of the samples.

(b) (From the Interstate Highway 5 bridge between Vancouver, Washington, and Portland, Oregon, to the mouth). Average concentrations of coliform bacteria to exceed 1000 per 100 milliliters, with 20 percent of the samples not to exceed 2400 per 100 milliliters.

(3) Turbidity. (Jackson Turbidity Units, JTU). Turbidities to exceed 5 JTU above natural background values except for certain short-term activities which may be specifically authorized by the Sanitary Authority under such conditions as it may prescribe and which are necessary to accommodate essential dredging or construction where turbidities in excess of this standard are unavoidable.

(4) Hydrogen-Ion Concentration. pH values to fall outside the range of 7.0 to 8.5.

(5) Temperature. Any measurable increase when river temperatures are 68° F. or above, or more than 2° F. increase when river temperatures are 66° F. or less.

(6) Dissolved Chemical Substances. (Above the zone of marine water intrusion, approximate river mile 40). Guide concentrations listed below to be exceeded except as may be specifically authorized by the Sanitary Authority upon such conditions as it may deem necessary to carry out the general intent of Section 11-010 of this subdivision and to protect the beneficial uses set forth in Table A.

	mg/l
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.01
Chloride (Cl)	30.
Chromium (Cr)	0.05
Copper (Cu)	0.005
Cyanide (CN)	0.01
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	200.
Zinc (Zn)	0.1
Heavy metals (Totals including Cu, Pb, Zn, and others of non-specific designation)	0.5

11-055 SPECIAL WATER QUALITY STANDARDS FOR THE PUBLIC WATERS OF THE MAIN STEM OF THE GRANDE RONDE RIVER. The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-025, except where this section imposes a conflicting requirement with the provisions of Section 11-025, this section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in the waters of the Grande Ronde River:

(1) Dissolved Oxygen.(DO). DO concentrations to be less than 75% of saturation at seasonal low or less than 95% of saturation in spawning areas during spawning, hatching, and fry stages of salmonid fishes.

(2) Organisms of the Coliform Group where Associated with Fecal Sources. (MPN or equivalent MF using a representative number of samples). Average concentrations of coliform bacteria to exceed 1000 per 100 milliliters, with 20% of these samples not to exceed 2400 per 100 milliliters.

(3) Turbidity. (Jackson Turbidity Units, JTU). Turbidities to exceed 5 JTU above natural background values except for certain short-term activities which may be specifically authorized by the

Sanitary Authority under such conditions as it may prescribe and which are necessary to accommodate essential dredging or construction where turbidities in excess of this standard are unavoidable.

(4) Temperature. Any measurable increase when river temperatures are 68° F. or above, or more than 2° F. increase when river temperatures are 66° F. or less.

(5) Dissolved Chemical Substances. Guide concentrations listed below to be exceeded except as may be specifically authorized by the Sanitary Authority upon such conditions as it may deem necessary to carry out the general intent of Section 11-010 of this subdivision and to protect the beneficial uses set forth in Table A.

	mg/1
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.01
Chloride (Cl)	25.
Chromium (Cr)	0.05
Copper (Cu)	0.005
Cyanide (CN)	0.01
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	200.
Zinc (Zn)	0.1
Heavy metals (Totals including Cu, Pb, Zn, and others of non-specific designation)	0.5

11-060 WATER QUALITY STANDARDS FOR THE PUBLIC WATERS OF THE MAIN STEM OF THE WALLA WALLA RIVER. The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-025, except where this section imposes a conflicting requirement with the provisions of Section 11-025, this section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in the waters of the Walla Walla River:

(1) Dissolved Oxygen (DO). DO concentrations to be less than 75% of saturation at seasonal low or less than 95% of saturation in spawning areas during spawning, hatching, and fry stages of salmonid fishes.

(2) Organisms of the Coliform Group where Associated with Fecal Sources. (MPN or equivalent MF using a representative number of samples). Average concentrations of coliform bacteria to exceed 1000 per 100 milliliters, with 20% of these samples not to exceed 2400 per 100 milliliters.

(3) Turbidity. (Jackson Turbidity Units, JTU). Turbidities to exceed 5 JTU above natural background values except for certain short-term activities which may be specifically authorized by the Sanitary Authority under such conditions as it may prescribe and which are necessary to accommodate essential dredging or construction where turbidities in excess of this standard are unavoidable.

(4) Temperature. Any measurable increase when river temperatures are 68° F. or above, or more than 2° F. increase when river temperatures are 66° F. or less.

(5) Dissolved Chemical Substances. Guide concentrations listed below to be exceeded except as may be specifically authorized by the Sanitary Authority upon such conditions as it may deem necessary to carry out the general intent of Section 11-010 of this subdivision and to protect the beneficial uses set forth in Table A.

	mg/1
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.01
Chloride (Cl)	25.
Chromium (Cr)	0.05
Copper (Cu)	0.005
Cyanide (CN)	0.01
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	200.
Zinc (Zn)	0.1
Heavy metals (Totals	0.5

including Cu, Pb, Zn,
and others of non-
specific designation)

11-065 WATER QUALITY STANDARDS FOR THE MAIN STEM OF THE SNAKE RIVER IN AND ADJACENT TO OREGON. The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-025, except where this section imposes a conflicting requirement with the provisions of Section 11-025, this section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in the waters of the Snake River:

(1) Dissolved Oxygen. (DO). DO concentrations of surface waters to be less than 75% of saturation at seasonal low or less than 95% of saturation in spawning areas during spawning, hatching, and fry stages of salmonid fishes.

(2) Organisms of the Coliform Group where Associated with Fecal Sources. (MPN or equivalent MF using a representative number of samples). Average concentrations of coliform bacteria to exceed 1000 per 100 ml, with 20% of samples not to exceed 2400 per 100 ml.

(3) Turbidity. (Jackson Turbidity Units, JTU). Turbidities to exceed 5 JTU above natural background values except for certain short-term activities which may be specifically authorized by the Sanitary Authority under such conditions as it may prescribe and which are necessary to accommodate essential dredging or construction where turbidities in excess of this standard are unavoidable.

(4) Temperature. Any measurable increase when river temperatures are 70° F. or above, or more than 2° F. increase when river temperatures are 68° F. or less.

(5) Dissolved Chemical Substances. Guide concentrations listed below to be exceeded except as may be specifically authorized by the Sanitary Authority upon such conditions as it may deem necessary to carry out the general intent of Section 11-010 of this subdivision and to protect the beneficial uses set forth in Table A.

	mg/l
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.01
Chloride (Cl)	50.
Chromium (Cr)	0.05
Copper (Cu)	0.005
Cyanide (CN)	0.01
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	750.
Zinc (Zn)	0.1
Heavy metals (Totals including Cu, Pb, Zn, and others of non-specific designation)	0.5

(6) Hydrogen-Ion Concentration. (pH). pH values to fall outside the range of 7.0 to 9.0.

11-070 WATER QUALITY STANDARDS FOR THE MARINE AND ESTUARINE WATERS OF OREGON (excluding estuarine waters of the Columbia River). The provisions of this section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 11-025, except where this section imposes a conflicting requirement with the provisions of Section 11-025, this section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in marine or estuarine waters:

(1) Dissolved Oxygen. (DO). (Outside of zones of upwelled marine waters naturally deficient in DO). DO concentrations to be less than 6 milligrams per liter for estuarine waters, or less than saturation concentrations for marine waters.

(2) Organisms of the Coliform Group. (MPN or equivalent MF using a representative number of samples).

(a) (For marine and shellfish growing waters). The median concentration of coliform bacteria of sewage origin to exceed 70 per 100 milliliters.

(b) (For estuarine waters other than in shellfish growing areas). Average concentrations of coliform bacteria, where associated with fecal sources, to exceed 240 per 100 ml or to exceed this value in more than 20% of samples.

(3) Hydrogen Ion Concentration (pH). pH values to be outside the range of 7.0 and 8.5 over shellfish growing areas.

(4) Turbidity. (Jackson Turbidity Units JTU.) Turbidities to exceed 5 JTU above natural background values except for certain short-term activities which may be specifically authorized by the Sanitary Authority under such conditions as it may prescribe and which are necessary to accommodate essential dredging or construction where turbidities in excess of this standard are unavoidable.

(5) Temperature. Any significant increase above natural background temperatures, or water temperatures to be altered to a degree which creates or can reasonably be expected to create an adverse effect on fish or other aquatic life.

11-075 IMPLEMENTATION AND ENFORCEMENT PLAN. The Implementation and Enforcement Plan for the Public Waters of the State of Oregon, a copy of which is attached hereto and by this reference made a part hereof, is hereby adopted and prescribed by the Oregon State Sanitary Authority.

Hist: Filed 6-19-67 as SA 27

[ED. NOTE: Pursuant to ORS 183.360 (3), the Implementation and Enforcement Plan for the Public Waters of the State of Oregon is not published in the Oregon Administrative Rules Compilation. Copies may be obtained from the Secretary of State as provided by ORS 183.050].

TABLE A

BENEFICIAL USES TO BE PROTECTED

	Domestic Water Supply (1)	Industrial Water Supply (1)	Irrigation	Livestock Watering	Anadromous Fish Passage	Salmonid Fish Rearing	Salmonid Fish Spawning	Resident fish and other Aquatic life	Hunting and Wilflife	Fishing	Water Skiing & Swimming	Pleasure Boating	Aesthetic Qualities	Navigation
GOOSE LAKE				X		X		X	X	X	X	X	X	
GRANDE RONDE RIVER	X	X	X	X	X	X	X	X	X	X	X	X	X	
WALLA WALLA RIVER	X	X	X	X	X	X	X	X	X	X	X	X	X	
SNAKE RIVER	X	X	X	X	X(2)	X	X	X	X	X	X	X	X	
COLUMBIA RIVER	X	X	X	X	X	X	X	X	X	X	X	X	X	X
KLAMATH RIVER														
(Klamath Lake to Keno Regulating Dam)	X(3)	X	X	X				X	X	X	X	X	X	
(Keno Regulating Dam to California Border)	X(3)	X	X	X		X	X	X	X	X	X	X	X	
WILLAMETTE RIVER														
(Mouth to Willamette Falls incl. Mult. Channel)	X(4)	X	X	X	X	X		X	X	X	X(5)	X	X	X
(Willamette Falls to Newberg)	X	X	X	X	X	X		X	X	X	X	X	X	X
(Newberg to Salem)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
(Salem to Coast Fork)	X	X	X	X	X	X	X	X	X	X	X	X	X	
MARINE AND ESTUARINE		X			X	X		X	X	X	X	X	X	X

(1) With adequate pre-treatment
(2) Up to Oxbow Dam (River mile 273)
(3) By agreement of Klamath Compact Commission
(4) If no better source is reasonably attainable
(5) Not to conflict with commercial activities in Portland Harbor

ADDENDUM

PART III

Statistics on Land Management Practices and Conservation Measures

STATISTICS ON LAND MANAGEMENT PRACTICES AND CONSERVATION MEASURES

The size of these identified land practices and conservation measures is summarized in the tables following. A history of activity for some is presented so that trends can be seen. These statistics refer to BLM administered lands only. Size figures for other practices were not readily obtainable in so short a time. The Task Group thought that these statistics would suffice for the pilot review, since BLM accounts for about 95 percent of the Federal land being considered.

TIMBER MANAGEMENT

	Timber Sales			Reforestation		
Fiscal Year	Volume MBF	Clear Cut Acres	Partial Cut Acres	Acres Seeded	Acres Planted	Acres Site Prep.
1963	1,575,159	33,176	25,052	15,446	22,016	-
1964	1,573,970	30,534	27,869	8,927	24,330	9,788
1965	1,239,935	23,126	28,510	10,859	16,653	7,895
1966	1,245,450	21,315	38,186	10,483	17,195	3,465
1967	1,373,567	24,445	46,857	15,501	17,406	18,998
1968	1,371,447	23,891	45,210	10,703	15,554	16,313

Fiscal Year	Timber Stand Improvement Acres Thinned	Acres Released From Brush	Stream Clearance Miles
1963	3,980	-	-
1964	2,616	-	94
1965	177	993	97
1966	599	1,099	101
1967	507	456	117
1968	1,545	-	105
1969	-	-	112

RANGE MANAGEMENT

Allotment Management Plans (AMPs)

Fiscal Year		No. of Plans	*Acreage
1968		27	855,974
1969	(Scheduled)	94	1,864,000
1970	(Programmed)	63	1,049,000
1971	(Programmed)	38	1,454,000

*Figures represent only BLM land within allotments.

WATERSHED CONSERVATION & DEVELOPMENT

Fiscal Year	Seeding (Acres)	Brush Control (Acres)	Fencing (Mi.)	Water Development (Each)
Prior to 6/30/63	201,704	185,973	1,674 1/	1,466 1/
1964	62,806	46,203	342	179
1965	49,189	43,877	267	174
1966	57,618	65,140	421	265
1967	42,918	40,171	493	304
1968	35,146	62,627	474	267
1969 (Scheduled)	24,000	54,300	370	308
1970 (Planned)	18,000	36,000	210	226

The above acreages of seedings are largely crested wheatgrass (a non-native grass) and do not include the total acres of native rangeland seeded naturally. Crested wheatgrass is a palatable forage plant and when used as spring forage, allows deferment of grazing on native rangelands. Through deferment, the native vegetation increases in vigor, produces new seedlings, and both forage and watershed values are enhanced. Spraying of sagebrush and rabbitbrush (brush control) may result in an increase of forage production on native ranges up to three times. Protection of wildlife habitat is given major consideration in selection of brush control areas.

1/ Does not include projects prior to FY 1954.

WILDLIFE HABITAT ACCOMPLISHMENTS

Fiscal Year	Streams Cleared[1] (Miles)	Banks Stabilized (Acres)	Streams Improved[2] (Miles)
Prior to 1963	100	-	-
1964	20	-	-
1965	20	-	-
1966	25	-	-
1967	17	1,000[3]	50
1968	6	-	50
1969 (Scheduled)	-	-	150
1970 (Planned)	-	-	150

1/ Under wildlife funding only - does not include standard cutting contract requirements.

2/ Pertains to physical improvements such as barrier by-passing and placement of gabions and spawning gravel, etc., that affect many miles of stream other than at the immediate site.

3/ Includes Oxbow Burn big game legume plantings.

OTHER WILDLIFE PRACTICES

	Revegetation in Acres			
Fiscal Year	Grasses & Legumes	Browse	Miles of Fencing	No. of Water Developments
To 1963	5,000	-	5	50
1964	4,000	500	5	20
1965	6,000	1,500	10	25
1966	4,000	800	5	31
1967	13,000	804	50	43
1968	9,000	2,500	15	80
1969	5,500	1,000	10	31
1970 (Planned)	500	200	5	23

RECREATION STATISTICS

Year	Sites	Visits
1967	60	6,100,000
1968	66	6,542,000

ROAD PROGRAM

The road construction & maintenance programs directly support all resource management activities. It is estimated that the permanent transportation system is about one-half complete state-wide. Fund limitations and shifting use patterns dictate that only a portion of the roads are maintained each year. The maintenance mileage includes work done by force account, contract, through agreement with FHWA, and timber sale purchasers. The latter two are pertinent to Western Oregon only.

MILES OF ROAD CONSTRUCTED

	Appropriated Funds		Timber Sale Constructed		
Year	O&C Access	PLD	W. Oregon	E. Oregon	*Miscellaneous
Prior to 1960	156	26	914	141	1,324
1960	30	14	250	10	563
1961	44	42	252	13	213
1962	85	23	306	9	166
1963	88	39	375	13	129
1964	38	4	475	50	393
1965	77	28	372	36	554
1966	16	65	424	23	422
1967	38	7	369	50	313
1968	28	9	420	11	491
Total	600	257	4,157	356	4,568

*Includes trespass, purchased and primitive roads.

MILES OF ROAD MAINTAINED

Year	Western Oregon	Eastern Oregon
1960	1,900	90
1961	2,000	110
1962	2,200	130
1963	2,400	150
1964	2,600	210
1965	2,800	230
1966	3,000	320
1967	3,200	400
1968	3,600	590

FIRE CONTROL

Numbers of fires, with acres burned, on lands managed by the Bureau of Land Management in Oregon. Fire control is by BLM in Eastern Oregon and by contract in Western Oregon.

Year	Number of Fires	Acres Burned
1964	287	17,965
1965	321	1,293
1966	347	49,265
1967	396	33,668
1968	409	19,248

MINERALS PROGRAM

Fiscal Year	Sales of Mineral Material (Cubic Yards)	Surface Rights Determination (Acres Examined)	Mineral Patents Issued (Each)	Minerals Cases Investigated (Each)	Minerals Resource Inventory Completed (Acres)
1960	318,180	294,672	4	223	
1961	68,150	2,404,497	4	258	
1962	19,586	4,205,639	5	599	
1963	637,517	5,322,161	5	477	70,000
1964	3,840,802	912,227	2	153	120,000
1965	1,332,144	662,132	2	107	160,000
1966	108,821	221,097	1	110	110,000
1967	193,936	177,881	1	*403	100,000

* Including Washington

BLM Minerals Management is not involved in any program, other than the sale of sand, gravel and stone, which actively affects the status of the land. Most of the projects are concerned with fact finding, completion of a minerals inventory, or the examination of mining claims under the Federal Mining Laws.

Community pits are established for the sale of stone, sand and gravel, and free use permits are issued to Government agencies from other pits. Regulations are in effect for the surface reclamation of the land, in addition to regulations controlling the method used in the mining operations.

ADDENDUM

PART IV

Map of Federal Lands Administered by the Interior Agencies in Oregon

Note: The map shows only those lands administered by BLM, NPS, and BSF&W. But this constitutes 98 percent of the lands being administered by Interior agencies in Oregon.